Measuring maternal vaccination rates: Comparison of two methods

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Two vaccines for pregnant women

Recommendation	Influenza vaccine	Tdap vaccine
Publication year	2004	2013, 2017
Number of doses	1, if pregnant or plan to be pregnant during flu season	1, every pregnancy
Timing during pregnancy	Any trimester	Preferably during the early part of gestational weeks 27-36
Primary purpose	Protect pregnant woman, unborn child, passively protect newborn infant	Passively protect newborn infant from pertussis

Tdap: tetanus-diphtheria-acellular pertussis vaccine. MMWR. February 22, 2013 / 62(07);131-135. MMWR. February 10, 2017 / 66(5);136–138.
Flu: MMWR. May 28, 2004 / 53(RR06);1-40.

Importance of monitoring rates

- New recommendations (Tdap)
- Changing recommendations (timing of Tdap)
- Identify populations with lower rates
- Target interventions

Challenges

- Current surveys are not both timely *and* local.
  - PRAMS (Pregnancy Risk Assessment Monitoring System)
  - Internet panel survey
- Immunization Information Systems (IIS) do not collect data regarding pregnancy.

PRAMS: Tetanus, Diphtheria, Pertussis Vaccination Coverage Before, During, and After Pregnancy — 16 States and New York City, 2011. MMWR. May 22, 2015 / 64(19);522-526.
Internet panel survey: https://www.cdc.gov/flu/fluvaxview/pregnant-women-nov2016.htm

Overview

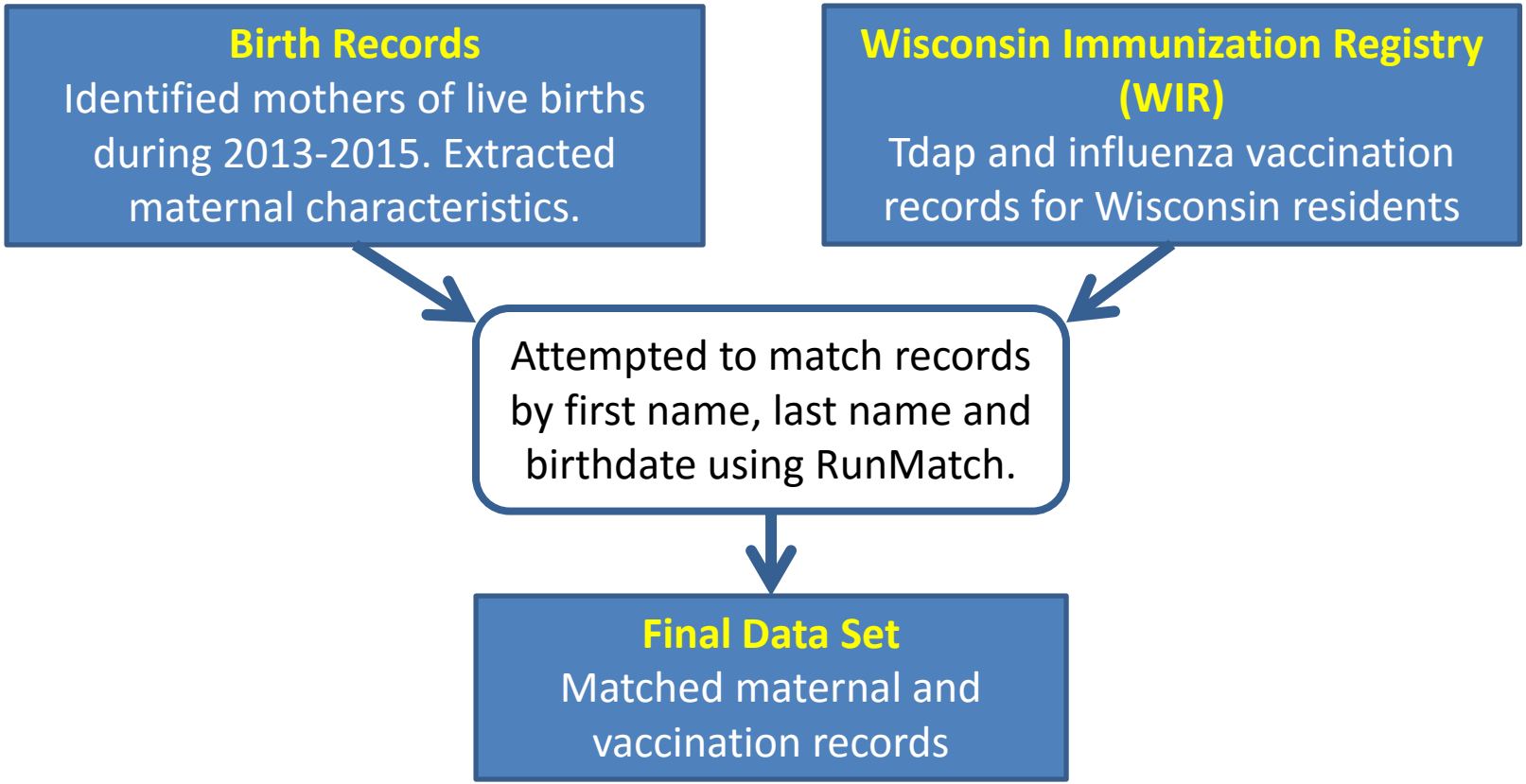
- Methods
  - IIS matched to birth records (IIS-match)
  - All-payer claims database (APCD)
- Results
- Strengths
- Limitations
- Data Use
- Next Steps

Method 1: IIS-Match

Wisconsin Immunization Registry (WIR)

- Wisconsin's IIS since 2000
- All ages
- All residents born ≥ 1995
- New clients and vaccinations are entered by public and private providers, pharmacies, HMOs, Medicaid, WIC

Data collection



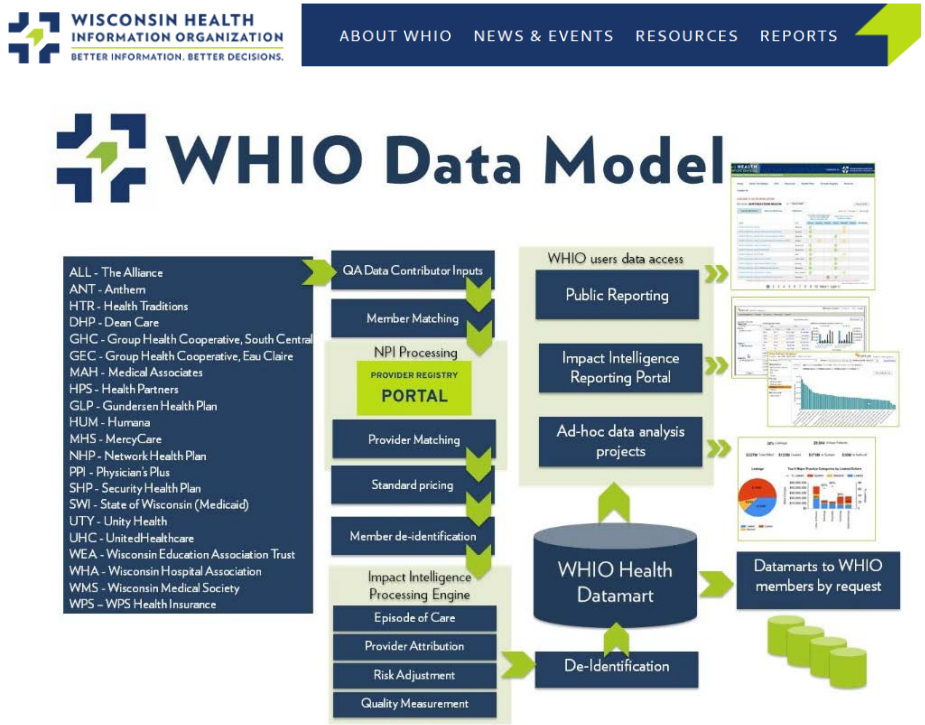
Data analysis

- Used gestational age at delivery from the birth record to determine date range of each pregnancy.
- Used WIR vaccination record to determine if Tdap or influenza vaccines ever received during pregnancy.
- Calculated Tdap and influenza vaccination rates during pregnancy by month-year of delivery.
- Evaluated timing of Tdap receipt during pregnancy.

Method 2:
All-payer claims database (APCD)

Wisconsin Health Information Organization

- De-identified, voluntary, statewide APCD
- Pharmacy and medical claims
- Wisconsin Medicaid, most private insurance plans in Wisconsin



http://wisconsinhealthinfo.org/

Data collection

- Used ICD-9 and CPT codes to identify women with claims for delivery during 1/2013–9/2015.
- Used CPT codes to identify claims for vaccinations (e.g., 90715 = Tdap).

Data analysis

- Vaccinations received during the 40 weeks before delivery were assumed to be received during pregnancy.
- Calculated Tdap and influenza vaccination rates during pregnancy by month-year of delivery.
- Tdap receipt 2-13 weeks before delivery was used as proxy to evaluate receipt during recommended time.

Results

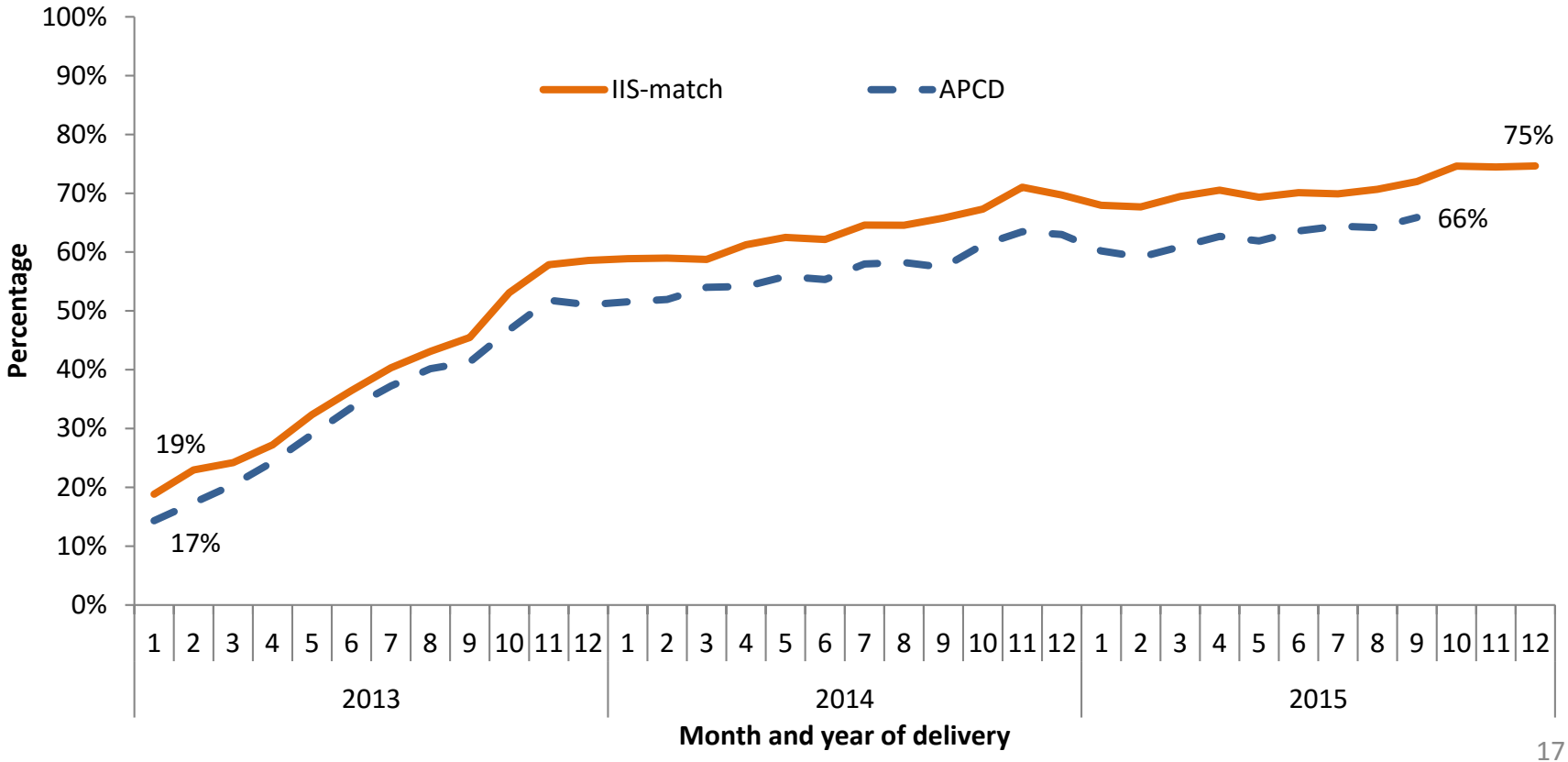
Results: IIS-Match

- 178,199 Wisconsin women during 2013–2015 delivered 1+ live birth.
- **91%** (n=162,015 women) and their 178,537 pregnancies were matched to WIR records.
- Women not matched to WIR records were more often Hispanic, foreign-born, with inadequate prenatal care, self-paid delivery, midwife delivery than women with WIR records.

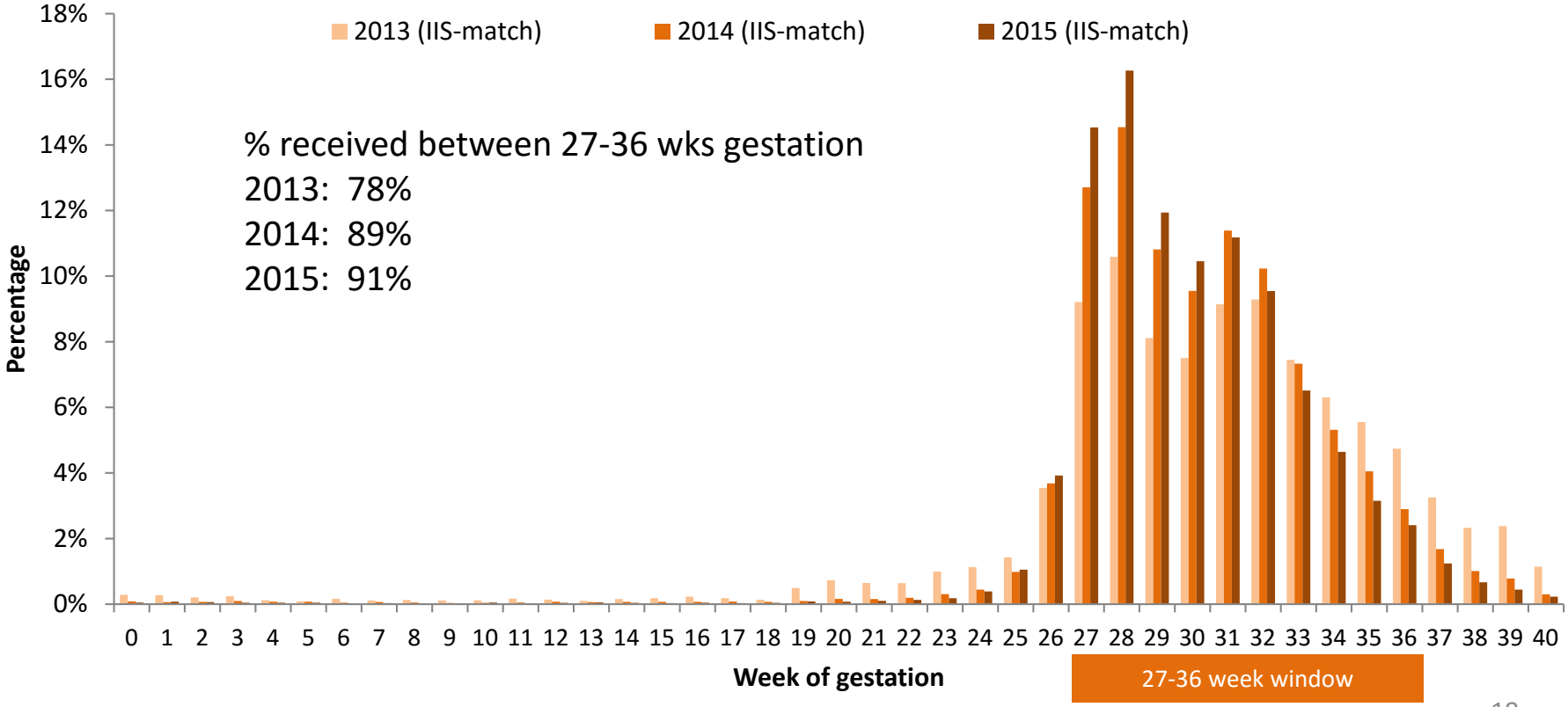
Results: APCD

- Identified 111,833 pregnancies that ended in delivery during 1/2013–9/2015.
- Represented approximately **62%** of pregnancies that ended in delivery during this time period.

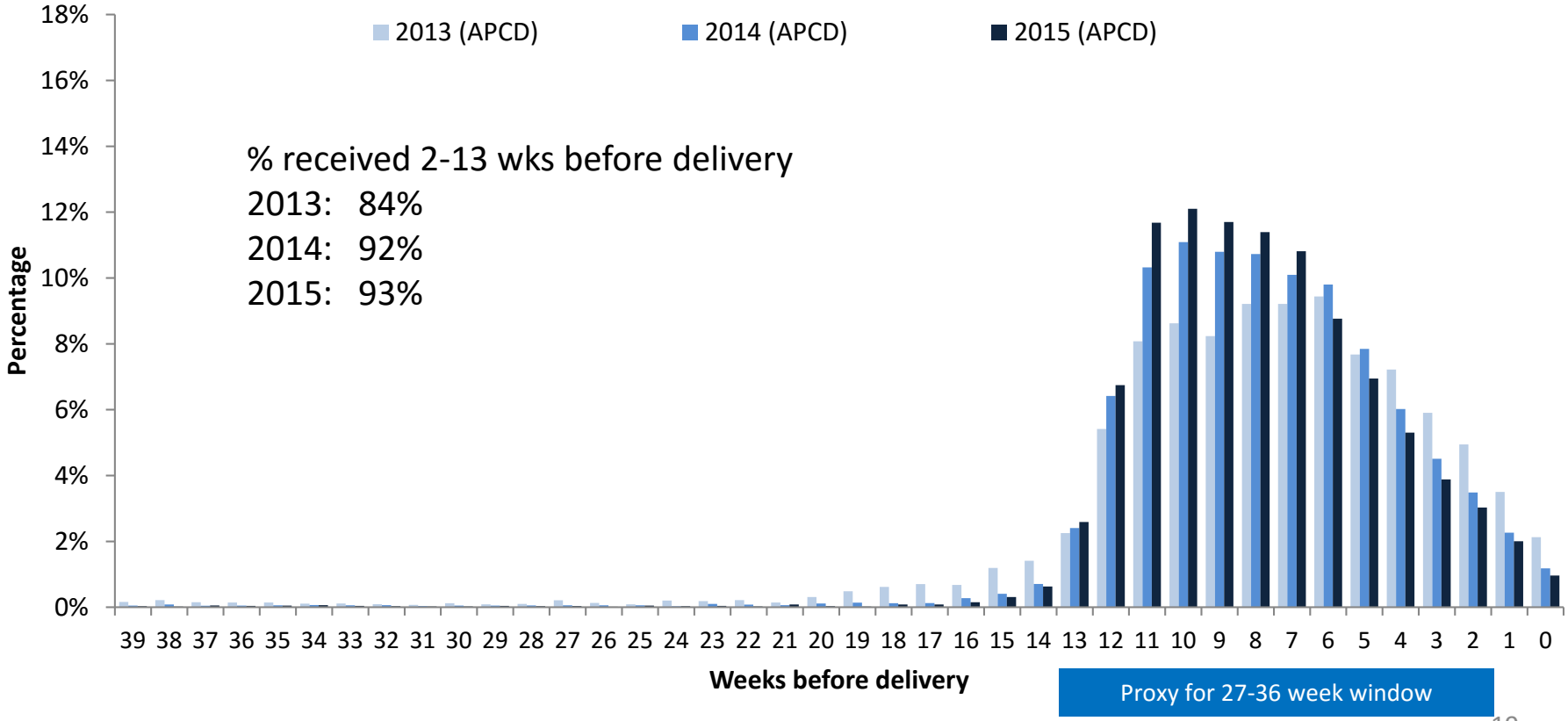
Tdap vaccination rates



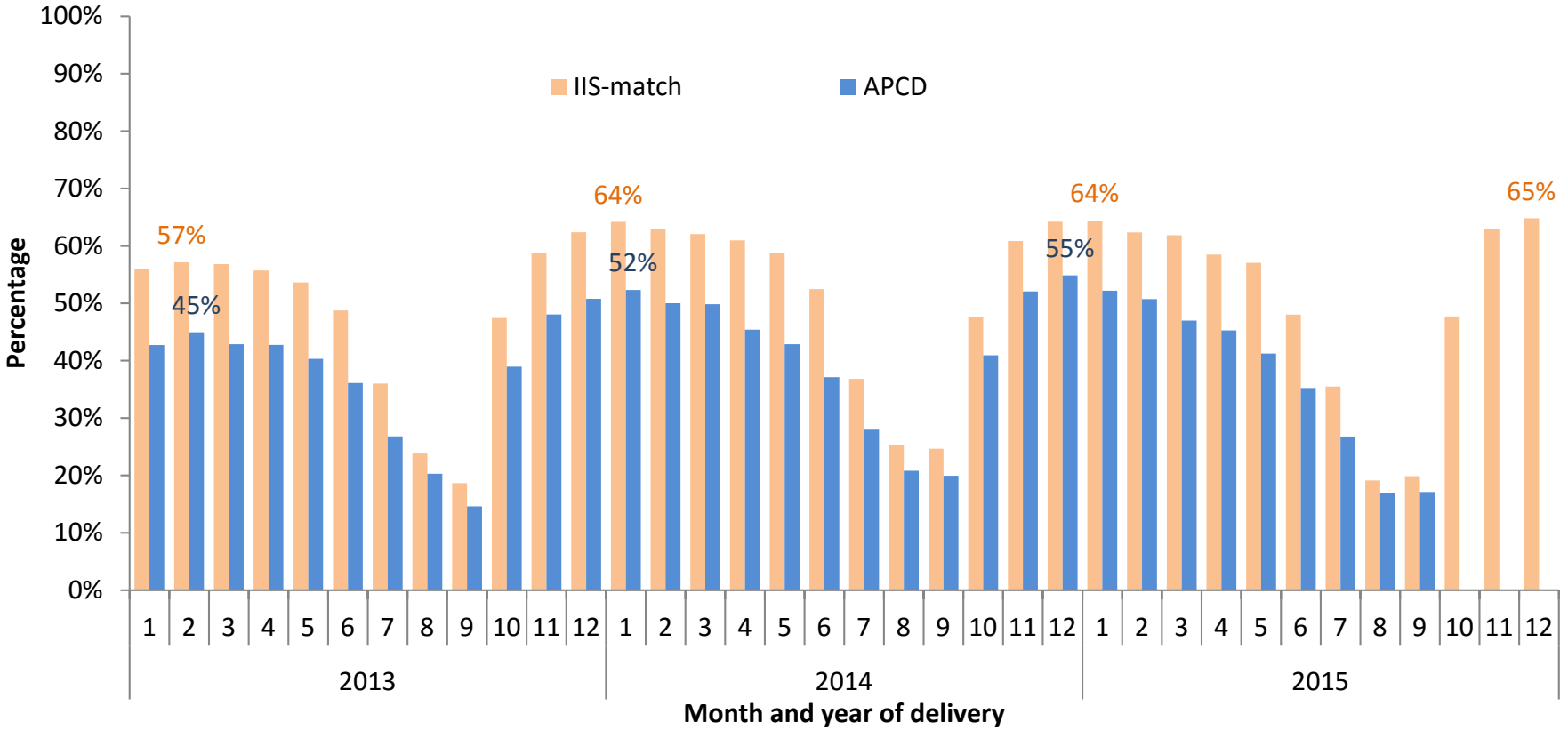
Timing of Tdap receipt (IIS-match)



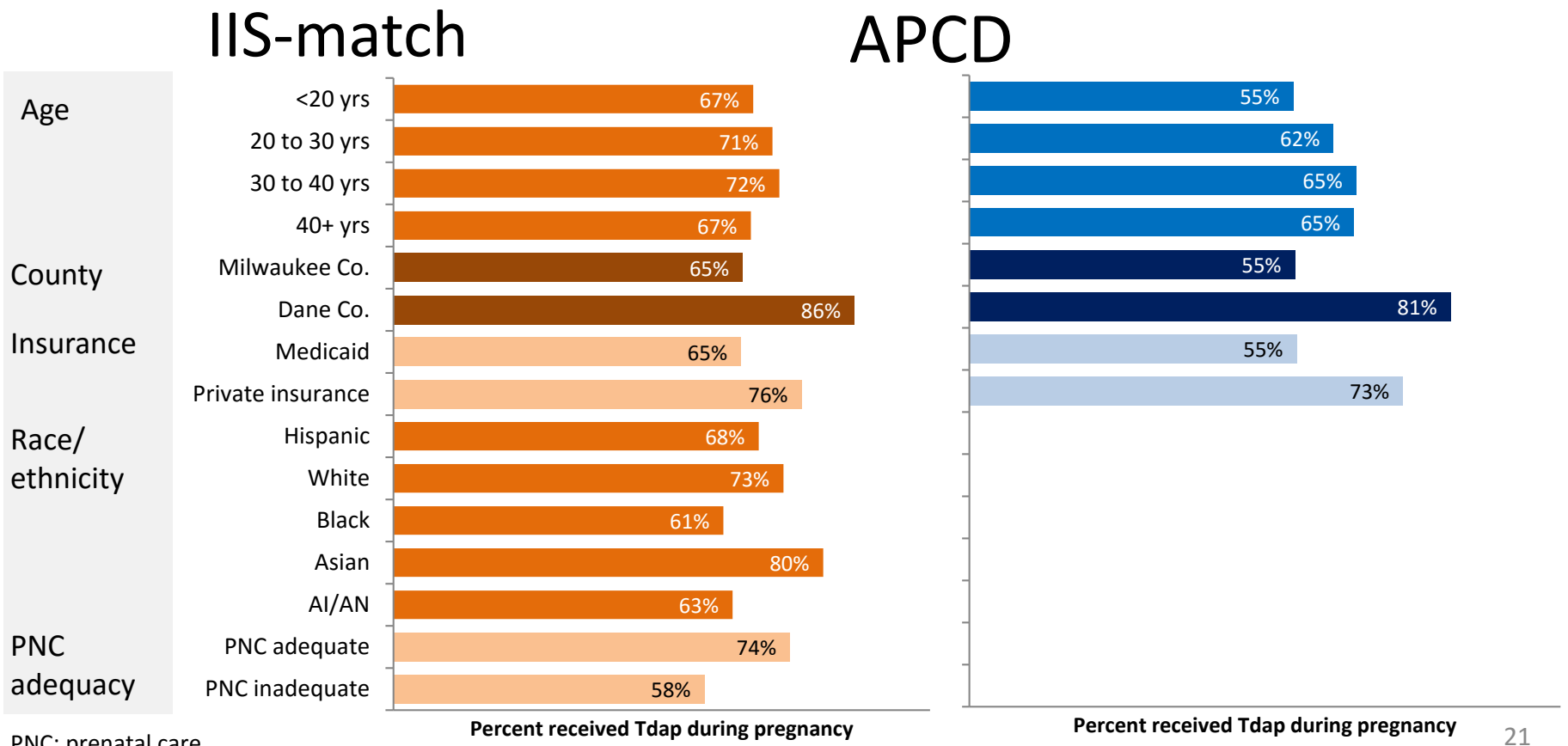
Timing of Tdap receipt (APCD)



Influenza vaccination rates

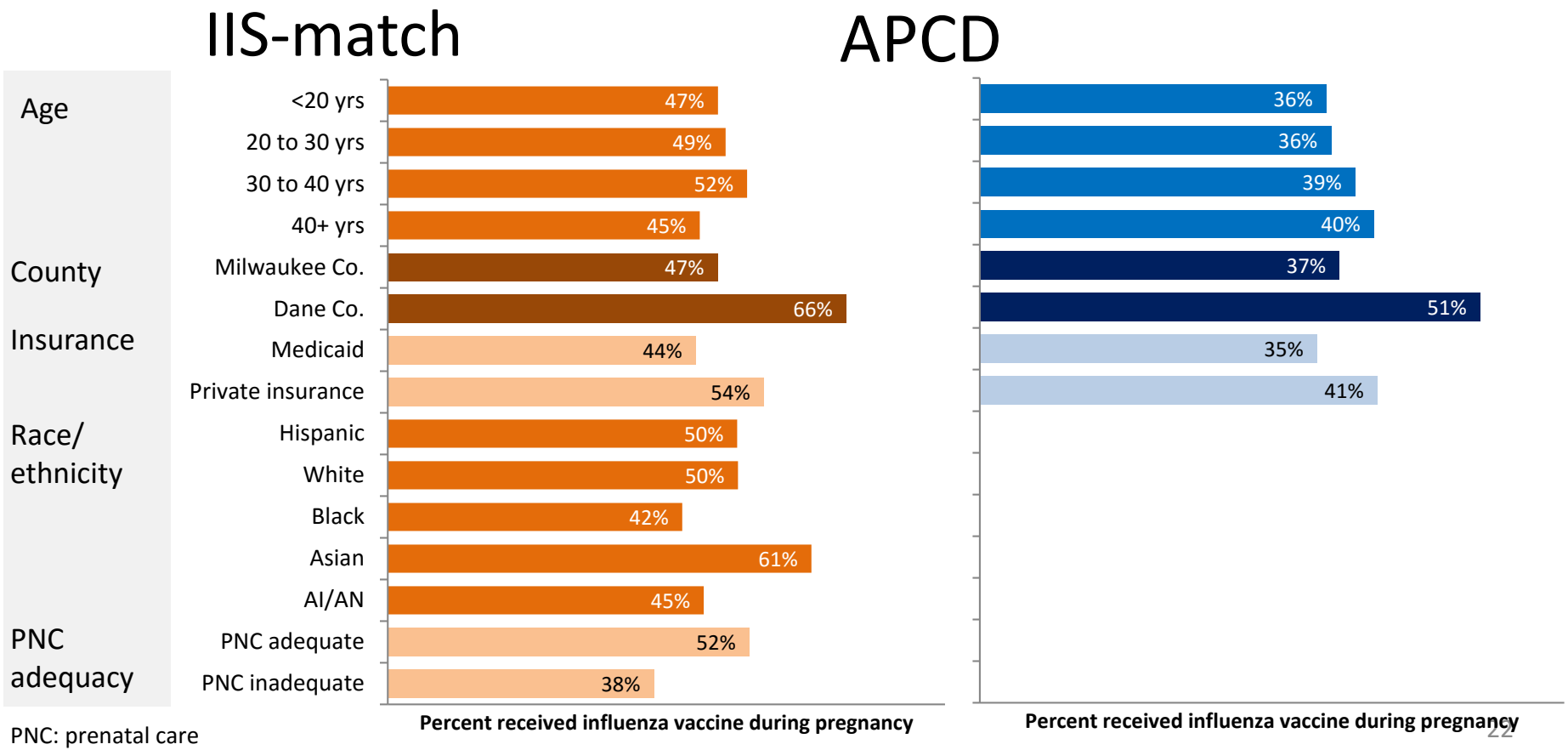


Tdap rates, by characteristic and method, 2015



PNC: prenatal care

Flu rates, by characteristic and method, 2015



PNC: prenatal care

Strengths

IIS-Match

- Population-based
- 91% of women with live birth
- Provides access to a vaccination history across multiple providers, regardless of insurance status
- Timing of Tdap receipt by week of gestation

APCD

- Population-based (insured)
- 62% of pregnancies ending in delivery
- Might provide more timely data

Limitations

IIS-Match

- Not representative of women without an IIS record.
- Data acquisition might be delayed by finalization of birth records.
- Matching can be complicated by name changes/errors in birth or IIS record.
- Not feasible in jurisdictions lacking robust adult records in IIS.

APCD

- Not representative of women uninsured or insured by non-participating plans.
- Requires claim to be filed, so might underestimate rates in this population.
- Limited maternal characteristics to identify pockets of need.
- Timing of Tdap receipt is proxy.

Data Use and Next Steps

Data use

Immunization Data

Vaccination coverage rates

Unless otherwise specified, the data source for the immunization rates presented below is th
Immunization Registry.

https://www.dhs.wisconsin.gov/immunization/data.htm

Children

- 4:3:1:3:3:1:4 series, by county (PDF, 323 KB)
- 4:3:1:3:3:1:4 series, by region (PDF, 26 KB)
- Map (PDF, 285 KB)

Adolescents

- Adolescent rates, by county (PDF, 151 KB)
- Adolescent rates, by region (PDF, 98 KB)
- Maps: HPV (1 dose) (PDF, 348 KB) | HPV (3 doses) (PDF, 347 KB) | MeningACWY (1 dose) (PDF, 335 KB) | MeningACWY (up-to-date) (PDF, 342 KB) | Tdap (PDF, 325 KB)

Adults

- Adult rates, by county (PDF, 61 KB)
- Adult rates, by region (PDF, 12 KB)
- Vaccination at retail pharmacies (PDF, 1.9 MB)
- Maps: HPV (3 doses) (PDF, 342 KB) | Tdap (PDF, 342 KB) | Zoster (PDF, 342 KB) | PCV13 (PDF, 339 KB) | PPSV23 (PDF, 336 KB)

Pregnant women

- Are pregnant women in Wisconsin receiving the Tdap vaccine? P-01696 (PDF, 512 KB)
- Are your pregnant patients receiving Tdap vaccine? P-01713 (PDF, 462 KB)
- Tdap and influenza vaccination rates among insured pregnant women (data source: Wisconsin Health Information Organization)
  - Report for 2012-2015 (PDF, 223 KB)
  - MMWR article, 2013-2014

Data use

Morbidity and Mortality Weekly Report (*MMWR*)

Pertussis and Influenza Vaccination Among Insured Pregnant Women — Wisconsin, 2013-2014

Weekly
July 17, 2015 / 64(27);746-750

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On February 22, 2013, the Advisory Committee on Immunization Practices (ACIP) revised recommendations for vaccination of pregnant women to recommend tetanus-diphtheria-acellular pertussis vaccine (Tdap) during every pregnancy, optimally at 27–36 weeks of gestation, to prevent pertussis among their newborns (*1*). Since 2004, influenza vaccination has been recommended for pregnant women in any trimester to prevent influenza and associated complications for mother and newborn (*2*). To evaluate vaccination of pregnant women in Wisconsin after the 2013 Tdap recommendation, health insurance claims data for approximately 49% of Wisconsin births were analyzed. The percentage of women who received Tdap during pregnancy increased from 13.8% of women [illegible] of whom received Tdap 2–13 weeks before delivery) to 51.0% of women delivering during March 2014 (90.9% of whom

FIGURE 1. Percentage of the study population who received Tdap, influenza, or both vaccines during pregnancy, by month of delivery — Wisconsin, January 2013–March 2014

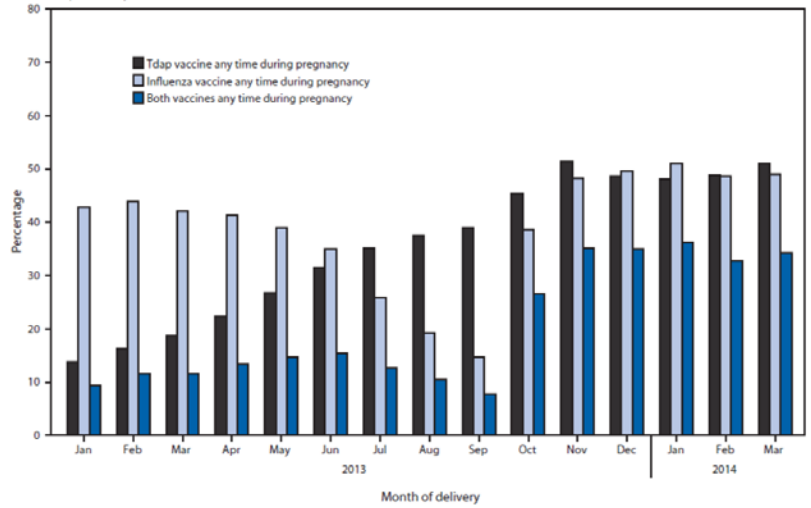
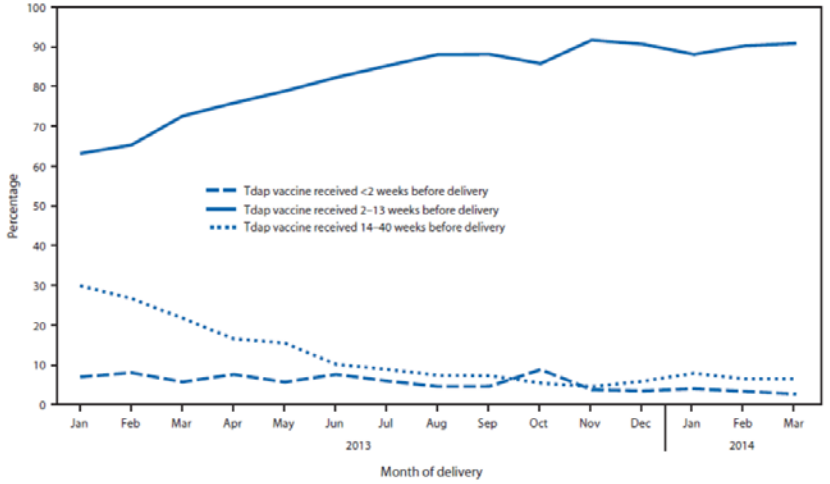


FIGURE 2. Timing of Tdap vaccine receipt among women in the study population who received Tdap vaccine during pregnancy, by month of delivery — Wisconsin, January 2013–March 2014



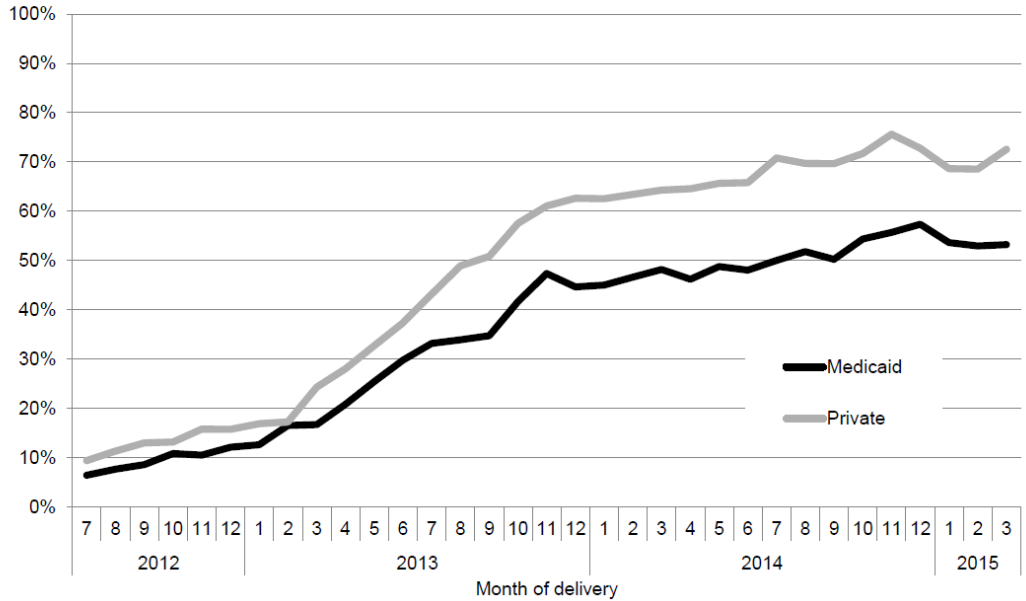
Data use

Vaccination Rates Among Insured Pregnant Women in Wisconsin July 2012–March 2015

Recommendations for vaccination during pregnancy

- **Pertussis**: Since February 2013, pregnant women are recommended to receive tetanus-diphtheria-acellular pertussis (Tdap) vaccine during *every* pregnancy, optimally between 27–36 weeks of gestation. Pertussis vaccination during pregnancy provides passive protection to newborn infants, who are at high risk of severe illness and complications from pertussis.
- **Influenza**: Since 2004, pregnant women are recommended to receive influenza vaccine during any during pregnancy protects both mother and infant from

Percentage of pregnant women who received Tdap vaccine during pregnancy by type of insurance and month of delivery—Wisconsin, July 2012–March 2015



isconsin Health Information Organization (WHIO),
s between July 2012 and March 2015 were evaluated. WHIO
nsin deliveries; 7% of women had two deliveries during the
generalizable to uninsured women or women insured by
D.
Tdap vaccination during every pregnancy, the percentage of
y increased to approximately 60%.
gnancy, most received Tdap at the recommended time, 2–13

g every pregnancy, Tdap vaccination rates should be similar
December 2014, Tdap vaccination rates were lower among
time period. Tdap vaccination rates during the second
d received Tdap during the earlier pregnancy compared with
earlier pregnancy (68% versus 49%).

Data use

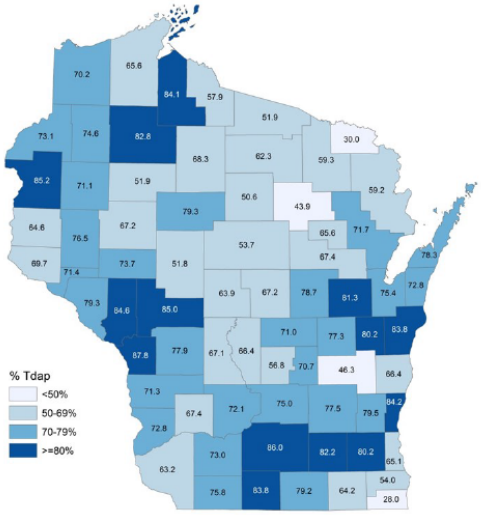
Are pregnant women in Wisconsin receiving the Tdap vaccine?

*To protect their newborns from pertussis (whooping cough), it is recommended that pregnant women receive Tdap vaccine during **every** pregnancy.*

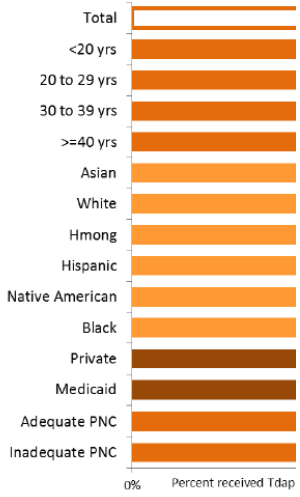
Among Wisconsin women who delivered during 2015, **71% received Tdap during pregnancy**, and 91% of these women received Tdap during the recommended time during pregnancy (27-36 weeks ge

Percentage of pregnant women who received Tdap during pregnancy,

By county of residence



By age, race/ethnicity, insurance type,



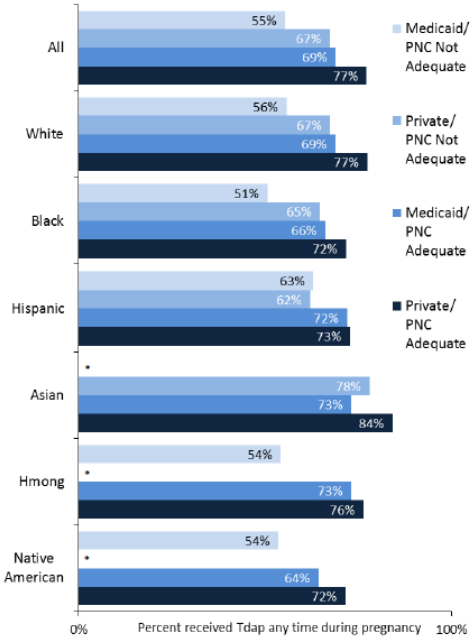
Thirty-two counties had Tdap vaccination rates less than the statewide rate of 71%. Only four counties had Tdap vaccination rates less than 50%.

Women with inadequate prenatal ca
Native American women had the low

https://www.dhs.wisconsin.gov/immunization/data.htm

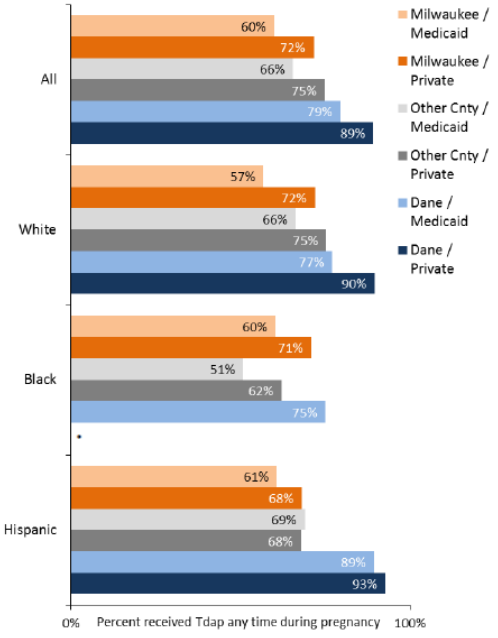
Percentage of pregnant women who received Tdap during pregnancy, 2015

By race/ethnicity, insurance type, adequacy of prenatal care (PNC)



Among every racial and ethnic group, Tdap vaccination rates were highest among women with private insurance and adequate prenatal care (PNC).

By race/ethnicity, county of residence, insurance type



Among every racial and ethnic group, Tdap vaccination rates tended to be lower among Medicaid-insured women in Milwaukee County .

Data use

Are your pregnant patients receiving Tdap vaccine?

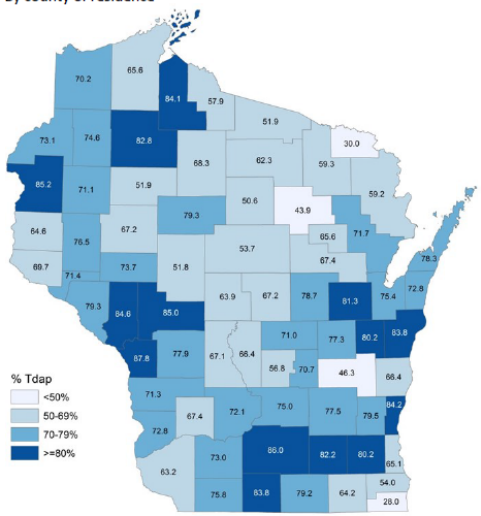
*To protect their newborns from pertussis (whooping cough), pregnant women are recommended to receive Tdap vaccine during **every** pregnancy.*

https://www.dhs.wisconsin.gov/immunization/data.htm

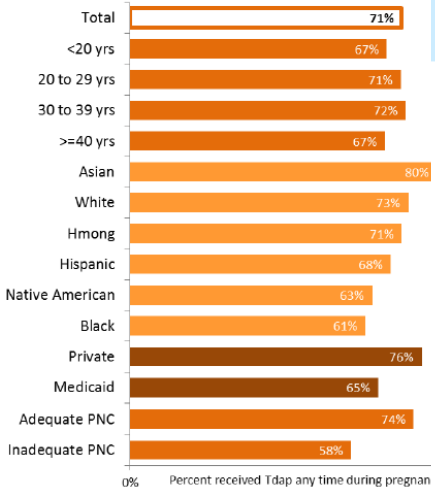
Among Wisconsin women who delivered during 2015, **71% received Tdap anytime during pregnancy**, and 91% of these women received Tdap during the recommended time during pregnancy (27-36 weeks gestation).

Percentage of pregnant women who received Tdap during pregnancy, Wisconsin, 2015

By county of residence



By age, race/ethnicity, insurance type, and adequacy of prer



Thirty-two counties had Tdap vaccination rates less than the statewide rate of 71%. Only four counties had Tdap vaccination rates less than 50%.

Women with inadequate prenatal care, Medicaid-insured, Native American women had the lowest Tdap vaccination

Strategies for prenatal care providers **to prevent infant pertussis**

Strongly recommend Tdap to your patients during *every* pregnancy.
Administer the vaccine in your office or refer the patient to an immunization provider.

Optimal timing of Tdap administration is between 27 and 36 weeks gestation to maximize the maternal antibody response and passive antibody transfer to the infant.
Because recent evidence suggests that Tdap administration earlier during the 27-36 week window provides more passive immunity to the newborn, Tdap should be administered early during the 27-36 week window, if possible. Early during pregnancy, discuss with your patient the importance of Tdap vaccination during *every* pregnancy.

Postpartum Tdap administration is NOT optimal.
Tdap during pregnancy provides the best protection for mother and infant. Fewer babies will be hospitalized for and die from pertussis when Tdap is given during pregnancy rather than during the postpartum period.

Tdap should NOT be offered as part of routine preconception care.
Protection from pertussis vaccines does not last as long as vaccine experts would like, so Tdap is recommended during pregnancy in order to provide optimal protection to the infant. If Tdap was administered during a preconception visit, it should be administered again during pregnancy between 27 and 36 weeks gestation.

Tdap can be safely administered earlier in pregnancy if needed.
Pregnant women should received Tdap anytime during pregnancy if it is indicated for wound care or during a community pertussis outbreak. If Tdap is administered earlier in pregnancy, it should not be repeated between 27 and 36 weeks gestation; only one dose is recommended during each pregnancy.

Recommend pertussis vaccination for close contacts.
Ensure the infant's close contacts, including siblings, other parents, grandparents and caregivers are up-to-date with pertussis vaccinations (DTaP or Tdap). Administer needed vaccines or refer for vaccination as needed.

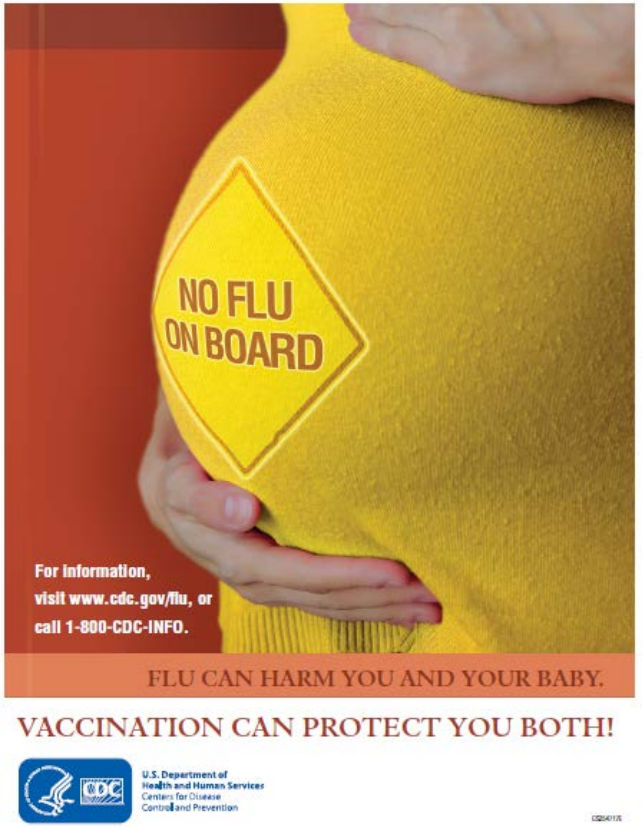
References and resources

https://www.cdc.gov/pertussis/pregnant/
https://www.cdc.gov/pertussis/downloads/fs-hcp-provide-prenatal-care.pdf
https://www.acog.org/-/media/Departments/Immunization/2013TdapMailingSmall.pdf

Wisconsin Department of Health Services
P-01713 (1/2017)

Next steps

- Obtain more recent data.
- Continue to monitor trends in maternal vaccination.
- Create influenza-specific reports.
- Work with partners to disseminate results, identify pockets of need and educate about importance of vaccination.



Conclusions

- Both methods allowed for a population-based assessment and produced similar trends:
  - Influenza vaccination rates were highest among women delivering during flu season and peaked at 55%-65%.
  - Tdap uptake increased substantially between 2013–2015, and most received Tdap during the recommended time.
  - Lower rates observed among certain subpopulations.
- Important to use an available method to monitor trends and identify pockets of need.

Acknowledgements

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Stephanie Schauer
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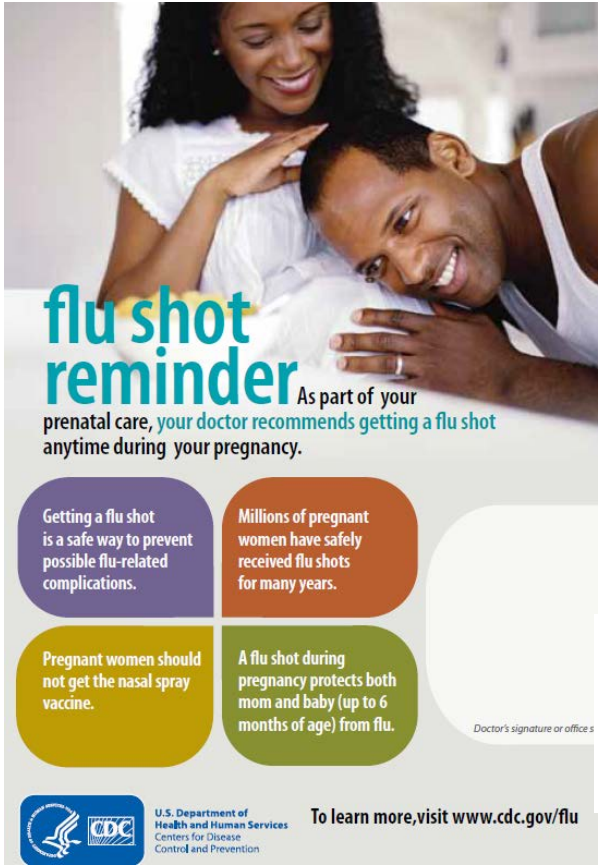
Jeffrey Davis
Office of Health Informatics
Richard Miller
Wendy Hart

Wisconsin Health Information Organization
Sara Jensen

CDC Resources and Materials
https://www.cdc.gov/flu/freeresources/print-pregnant.htm
https://www.cdc.gov/pertussis/materials/pregnant.html

Thank you



Talk to your doctor or midwife about the whooping cough vaccine.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Born with protection against whooping cough.

www.cdc.gov/whoopingcough