

Influenza vaccination trends among pregnant women and children

Capturing influenza vaccination trends with the precision of MarketScan databases.



While vaccination against influenza is recommended across all populations and ages, it is particularly important for pregnant women and children to get their flu shots. Pregnant women are more likely to be hospitalized with influenza compared to those of reproductive age who are not pregnant. It's also recommended women get vaccinated during pregnancy to protect both the mother and baby.¹ Children younger than 6 months cannot receive the influenza vaccine, so the best way to protect them is for their mother to be vaccinated during pregnancy. Children younger than five years old, and children of any age with chronic health conditions, also have higher risk for flu-related complications.²

The Centers for Disease Control and Prevention (CDC) has a long history monitoring influenza vaccination. [MarketScan® by Merative™](#), is a critical component of the CDC's maternal vaccination surveillance system which also includes the National Health Interview Survey, the Internet panel surveys, the Behavioral Risk Factor Surveillance System, and others.³ Researchers from both the CDC and MarketScan have published studies on influenza vaccination rates among pregnant women and children using data from MarketScan. The large sample sizes across privately insured and Medicaid enrollees, accompanied by patient-level inpatient, outpatient, and outpatient pharmacy data, make MarketScan a particularly desirable dataset for studying vaccination trends and potential missed opportunities among pregnant women and children.



Influenza vaccine trends during pregnancy

In a 2019 publication coauthored by MarketScan researchers, an analysis was conducted on influenza vaccination rates among pregnant women from 2010 to 2017 using the MarketScan Commercial and Medicaid databases.⁴ The study found that between 2010 and 2017, influenza vaccination coverage increased from 14.7% to 31.3% in the commercial population and from 9.7% to 17.5% in the Medicaid population. However, despite these increases, coverage was still well below the CDC's Healthy People 2020 target of 80%.⁵

Likewise, another study reported 32.1%, 30.8%, and 10.8% of pregnant women from MarketScan Commercial, Blue Health Intelligence (BHI) Commercial, and MarketScan Medicaid databases, respectively, received influenza vaccination during their pregnancy between August 2016 to December 2018 (Table 1). Again, vaccination rates were suboptimal compared to what is recommended for this population.⁶

Table 1: Proportions of influenza vaccinations for women whose pregnancy ended in live birth, miscarriage, or stillbirth at 12–55 years old, August 2016 through December 2018, % (95% Confidence Interval)⁶

	MarketScan Commercial	BHI Commercial	MarketScan Medicaid
Overall	32.1 (32.0–32.2)	30.8 (30.7–30.9)	18.0 (17.9–18.2)
Age at pregnancy outcome, years			
12–19	26.2 (25.5–27.0)	24.0 (23.3–24.7)	18.8 (18.4–19.1)
20–34	32.0 (31.8–32.1)	30.5 (30.4–30.6)	17.9 (17.7–18.1)
35–44	33.2 (32.9–33.5)	32.1 (31.9–32.3)	17.7 (17.1–18.2)
45–55	23.9 (21.9–25.9)	23.0 (21.7–24.3)	16.7 (11.0–22.3)



In 2022, CDC researchers published a study analyzing the timing of influenza vaccination among pregnant women using claims data.⁷ Women with a live delivery in the MarketScan database between 2010 and 2018 were included, and the relationship between the month of delivery and the timing of influenza vaccination of these women were examined. Overall, vaccination rates increased from 22.0% during the 2010–2011 flu season to 33.2% during the 2017–2018 flu season. The most vaccinations occurred at the beginning of flu season in September or October. The authors examined the vaccination coverage patterns for women who delivered from September through May and those who delivered from June through August. It was concluded that despite the observed uptake in vaccination rate among pregnant women, there was room for improvement, especially after October.

In a 2023 study, CDC researchers analyzed the influenza vaccination rates of infants by their mother’s vaccination status during pregnancy.⁹ Using 2017–2019 data from the MarketScan database, the authors found a positive relationship between mothers’ vaccination and their infants getting vaccinated on their first flu season.

Missed vaccination opportunities are of special interest to the CDC. In a 2020 study, Zhou *et al.* defined a missed vaccination opportunity as having at least one provider visit during the observation period and not having any vaccination by end of flu season.⁸ The CDC researchers examined in-plan vaccination coverage and missed vaccination opportunities between August 2016 and May 2017 among children ages 1–17 years old using the MarketScan Commercial database. Among the unvaccinated children, 93.1%, 84.1%, 73.6%, and 73.6% of infants, toddlers, school-aged children, and teenagers were found to have a missed opportunity.

Together, these studies highlight policy implications for providers, policy makers, and the public.



Influenza vaccination rates among pregnant women have improved, but more efforts are needed to bring vaccination coverage to the recommended levels.



Mothers’ vaccination status is positively associated with infants’ vaccination rate. Intervention to increase coverage among pregnant women could offer greater protection to mothers and infants.



There is a substantial number of missed vaccination opportunities among privately insured children, especially the older ones. Providers should be encouraged to use all clinical encounters to vaccinate children and improve vaccination coverage.

Considerations when using claims for vaccination studies

MarketScan was credited for its “large sample size and its ability to assess missed vaccination opportunity to inform vaccination policy” in a 2023 CDC publication entitled “Surveillance systems for monitoring vaccination coverage with vaccines recommended for pregnant women, United States.”³ However, there is a limitation that affects all administrative claims databases for influenza vaccination studies – vaccinations bypassing the health insurance system are not captured in claims. The magnitude of its impact on pregnant women and the pediatric population was explored and discussed.

When discussing the findings about the timing of influenza vaccination among pregnant women, Hong et al. commented that the underestimation related to claims data would be limited for pregnant women, as survey data indicated more than 80% of vaccinated women received vaccination via medical provider.⁷

Digging in even further, a 2022 publication looked at how closely vaccination rates for privately insured children from different data sources agree.¹⁰ Specifically, the researchers compared the vaccination rates (including those for influenza) from the National Immunization Survey-Child (NIS-Child), MarketScan, and the Healthcare Effectiveness Data and Information Set (HEDIS). NIS-Child has historically been used for childhood vaccination evaluation by the CDC and is nationally representative. But it is subject to bias inherent in survey data and has a 2-year lag. MarketScan claims and HEDIS share the same potential underreporting issue.

The estimated influenza vaccination coverage was 69.9% from MarketScan claims, 67.3% from the HEDIS, and 68.5% from NIS-Child. The vaccination rates for other diseases also showed varied, but small, differences among three data sources (Table 2).

Table 2: Childhood vaccination coverage among privately insured children by age 24 months, % (95% CI)¹⁰

Vaccine	NIS-Child (n=12,702)	MarketScan Commercial (n=135,721)	HEDIS (n=711)
DTaP			
≥3 doses	96.9 (96.3, 97.5)	95.0 (94.9, 95.2)	n/a
≥4 doses	87.1 (85.7, 88.5)	85.9 (85.7, 86.1)	85.7 (85.4, 85.9)
IPV (≥3 doses)	96.1 (95.4, 96.7)	91.8 (91.7, 92.0)	90.7 (90.5, 90.9)
MMR (≥1 dose)	93.7 (92.8, 94.5)	92.5 (92.3, 92.7)	92.2 (92.0, 92.4)
Hib			
Primary series	95.7 (94.5, 96.8)	94.6 (94.5, 94.8)	n/a
Full series	85.5 (83.7, 87.1)	83.4 (83.1, 83.6)	n/a
≥3 doses	94.8 (93.6, 95.9)	93.3 (93.1, 93.4)	91.5 (91.3, 91.6)
VAR (≥1 dose)	93.2 (92.3, 94.0)	92.2 (92.1, 92.4)	92.0 (91.8, 92.1)
PCV			
≥3 doses	94.9 (93.5, 96.0)	94.4 (94.3, 94.6)	n/a
≥4 doses	87.3 (85.6, 88.8)	86.9 (86.7, 87.1)	85.9 (85.7, 86.1)
HepA (≥1 dose)	87.5 (85.9, 89.0)	87.6 (87.4, 87.8)	87.6 (87.4, 87.8)
HepB (≥3 doses)	93.0 (91.8, 94.0)	85.8 (85.6, 86.0)	n/a
RV (≥2 or ≥3 doses)	83.5 (81.9, 85.0)	84.7 (84.5, 84.9)	82.5 (82.2, 82.7)
Influenza (≥2 doses)	68.5 (66.6, 70.4)	69.9 (69.7, 70.2)	67.3 (67.0, 67.6)

DTaP: Diphtheria, Tetanus, and Pertussis; IPV: Inactivated Polio Vaccine; MMR: Measles, Mumps, and Rubella; VAR: Varicella; PCV: Pneumococcal conjugate vaccine; HepA: Hepatitis A; HepB: Hepatitis B; RV: Rotavirus

The researchers concluded that administrative claims, like MarketScan and HEDIS, could serve as “alternative or even preferred data sources, especially when the focused vaccine is not likely to be missing in claims or medical records (e.g., vaccines other than HepB) or the objective is a more rapid vaccination coverage assessment.”

Moll et al. offered similar opinion on using claims as a data source for vaccination studies and pointed to the additional benefits of claims databases: “Claims databases allow researchers to follow a well-defined insured pregnant population longitudinally. Although unreimbursed encounters may not be reflected in the data, claims accurately capture exposures and outcomes based on reimbursed services.”⁶

MarketScan offers deterministic mother-infant linkages and deep expertise in designing and executing maternal exposure outcomes studies for both mothers and infants. With access to over 293M lives, sourced from a diverse pool of payers, and extensive knowledge in epidemiology, health economic and outcomes research, and regulatory submissions, MarketScan has the data and expertise you need for every phase of your research.

Every month, our team pulls together a report with our latest findings and perspectives. Next month, we will put MarketScan Mortality data in the spotlight.

Want to know more about MarketScan data, tools, and services?

[Talk to us ↗](#)

Want to see how others are using MarketScan?

[See real-world examples ↗](#)

About MarketScan

MarketScan by Merative provides deidentified, longitudinal, patient-level closed claims and specialty data for 293M+ patients sourced directly from a diverse pool of payers. Industry-leading researchers rely on MarketScan to derive valuable insights pertaining to health economics and outcomes research, treatment patterns, and disease progression across the industry resulting in more than 4,500 peer-reviewed manuscripts.

Learn more at

merative.com/real-world-evidence

About Merative

Merative is a data, analytics and technology partner for the health industry, including providers, health plans, employers, life sciences companies and governments. With trusted technology and human expertise, Merative works with clients to drive real progress. Merative helps clients orient information and insights around the people they serve to improve decision-making and performance. Merative, formerly IBM Watson Health, became a new standalone company as part of Francisco Partners in 2022.

Learn more at merative.com

References

- Centers for Disease Control and Prevention (2023). Flu & Pregnancy. [Flu & Pregnancy | CDC](#)
- Centers for Disease Control and Prevention (2022). Flu & Children at Higher Risk. [Flu & Children at Higher Risk | CDC](#)
- Meghani M, Razzaghi H, Kahn KE, Hung MC, Srivastava A, Lu PJ, Ellington S, Zhou F, Weintraub E, Black CL, Singleton JA. Surveillance Systems for Monitoring Vaccination Coverage with Vaccines Recommended for Pregnant Women, United States. *J Womens Health (Larchmt)*. 2023 Mar;32(3):260-270.
- Ghaswalla P, Poirrier JE, Packnett ER, Irwin DE, Gray SR, Buck PO. Maternal Immunization in the U.S.: A Nationwide Retrospective Cohort Study. *Am J Prev Med*. 2019 Sep;57(3):e87-e93.
- Office of Disease Prevention and Health Promotion. Immunization and infectious diseases. www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases/objectives
- Moll K, Wong HL, Fingar K, Zhou CK, Lu M, Hu M, Hobbi S, Burrell T, Baer B, Simard J, Obidi J, Chillarige Y, MaCurdy T, Anderson S, Shoaibi A. Vaccine exposure during pregnancy among privately and publicly insured women in the United States, 2016-2018. *Vaccine*. 2021 Oct 1;39(41):6095-6103.
- Hong K, Lindley MC, Zhou F. Coverage and Timing of Influenza Vaccination Among Privately Insured Pregnant Women in the United States, 2010-2018. *Public Health Rep*. 2022 Jul-Aug;137(4):739-748.
- Zhou F, Lindley MC. Variability in influenza vaccination opportunities and coverage among privately insured children. *Vaccine*. 2020 Sep 22;38(41):6464-6471.
- Zhou F, Lindley MC, Lee JT, Jatlaoui TC. Association Between Influenza Vaccination During Pregnancy and Infant Influenza Vaccination. *Obstet Gynecol*. 2023 Mar 1;141(3):563-569.
- Hong K, Hill HA, Tsai Y, Lindley MC, Zhou F. Vaccination Coverage of Privately Insured Children: Comparing U.S. Survey and Administrative Data. *Am J Prev Med*. 2022 Jul;63(1):107-110.

© Merative US L.P. 2023. All Rights Reserved.

Produced in the United States of America
December 2023

Merative and the Merative logo are trademarks of Merative US L.P. Other product and service names might be trademarks of Merative or other companies.

The information contained in this publication is provided for informational purposes only. While efforts were made to verify the completeness and accuracy of the information contained in this publication, it is provided AS IS without warranty of any kind, express or implied. In addition, this information is based on Merative's product plans and strategy as of the date of this publication, which are subject to change by Merative without notice. Nothing contained in this publication is intended to, nor shall have the effect of, creating any warranties or representations from Merative, or stating or implying that any activities undertaken by you will result in any specific performance results. Merative products are warranted according to the terms and conditions of the agreements under which they are provided.

MSN-5687610093 Rev 1

