The Effect of the Covid-19 Pandemic on Influenza Vaccine Uptake among Pregnant Women in the United States

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INTRODUCTION

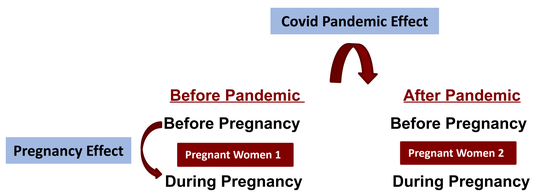
- Maternal influenza vaccination is a safe and effective preventive measure that protects both mothers and babies from influenza-related complications
- Recent studies in the general population highlight the impact of the COVID-19 pandemic on vaccine hesitancy

OBJECTIVE

- This is the first study to track changes in influenza vaccination behavior before and during pregnancy for the same woman and to assess whether the COVID-19 pandemic modified this pattern, using a difference-in-differences design
- Existing studies have primarily used a cross-sectional approach, focusing on either pregnant or general non-pregnant populations at a single point in time, which may not capture within-person behavioral changes

METHODS

Model: $logit(VaxUptake_{it}) = \alpha + \beta Cohort_i + \gamma Preg_{it} + \delta Preg_{it} * Cohort_t + X_i\phi + \epsilon_{it}$



Coefficients:

- β - $Cohort_i$: **Cohort Year Effect** on Influenza Vaccine Uptake among pre-pregnant women compared to baseline cohort
- γ - $Preg_{it}$: **Pregnancy Effect** on Influenza Vaccine Uptake at the baseline 2017-2018 cohort
- δ - $Preg_{it}$*$Cohort_t$: **Ratio-of-Odds-Ratio** to represent the change of pregnancy effect over influenza season.
- ϕ - X_i: a vector of time-invariant **demographic and comorbidity**

- **Data:** Optum's Clinformatics ® Data Mart
- **Population:** 310,725 pregnant women from 2017-2018 to 2022-2023 influenza season
- **Inclusion Criteria:** Women aged 18 to 49 who had a live birth between November 1, 2017, and October 31, 2023, with at least one year continuous enrollment prior to pregnancy
- **During Pregnancy - Influenza Vaccine Uptake:**

e.g. 2020-21 cohort during pregnancy: Track influenza vaccine uptake from 2020-July-1 until the delivery date of pregnancy

- **Before Pregnancy - Influenza Vaccine Uptake:**

e.g. 2020-21 cohort before pregnancy: Track influenza Vaccine Uptake from 2019-July-1 to the start date of pregnancy

RESULTS

Figure1: Adjusted Influenza Vaccine Uptake Rate among Pregnant Women Before and During Pregnancy from 2017-2018 to 2022-2023 Influenza Season

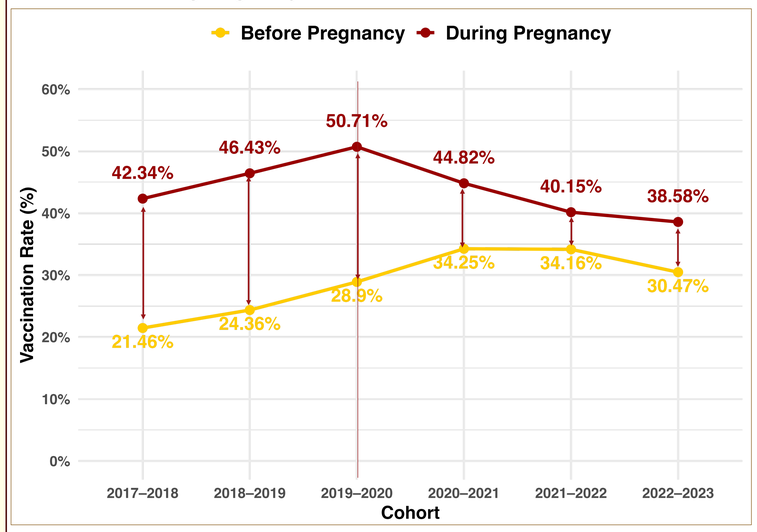


Table1: Coefficients from Logistic Regression Pregnancy Effect, Year Effect, Interaction Terms

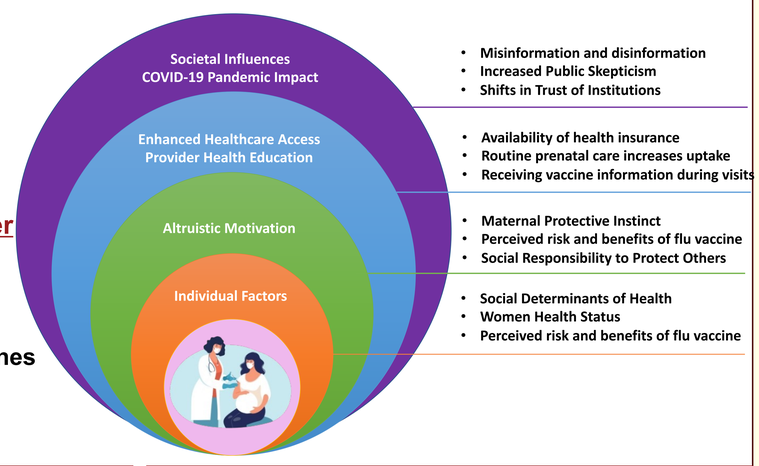
Variable	Odds Ratio (95% CI)
Cohort	
Cohort 2017-2018	Ref
Cohort2018-2019	1.19 (1.15, 1.22)
Cohort2019-2020	1.52 (1.47, 1.56)
Cohort2020-2021	1.97 (1.91, 2.03)
Cohort2021-2022	1.96 (1.91, 2.02)
Cohort2022-2023	1.64 (1.59, 1.70)
Pregnant Status	
Before Pregnancy	Ref
During Pregnancy	**2.84 (2.76, 2.92)**
Interaction Term	
Cohort2017-2018 * Pregnant	Ref
Cohort2018-2019 * Pregnant	1.01 (0.97, 1.05)
Cohort2019-2020 * Pregnant	0.95 (0.91, 0.98)
Cohort2020-2021 * Pregnant	0.57 (0.54, 0.59)
Cohort2021-2022 * Pregnant	0.46 (0.44, 0.48)
Cohort2022-2023 * Pregnant	0.52 (0.49, 0.54)

- **Pregnancy Effect:** Women are more likely to take influenza vaccine after getting pregnant
- **Overall Trend:** Influenza vaccine uptake increased before 2020-2021 influenza season but declined afterward
- **Covid Impact on Maternal Influenza Vaccine:** Steeper decline, indicating higher maternal vaccine hesitancy

CONCLUSION

- **Positive Pregnancy Effect on Influenza Vaccine Uptake**
  - **Increased Individual Health Risk**
  - **Altruistic Motivation**
  - **Enhanced Healthcare Access**
- **Decrease in Pregnancy Effect after Covid Pandemic**
  - **Experience with Covid Vaccine**
  - **Distrust and Misinformation of Vaccines**
  - **Protective instinct for babies**

Figure 2: Factors Influencing Influenza Vaccine Uptake Decisions Among Pregnant Women



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2. Kong G, Lim N-A, Chin YH, Ng YPM, Amin Z. Effect of COVID-19 Pandemic on Influenza Vaccination Intention: A Meta-Analysis and Systematic Review. Vaccines 2022;10:606.