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Impact of State of Residence on Adult Vaccination Uptake: a Multilevel Modeling Approach

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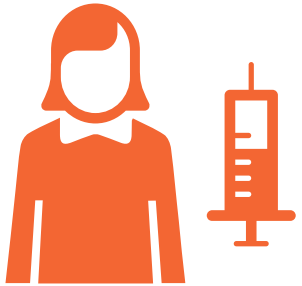
Introduction

- Adult vaccination rates are suboptimal, with variability across states[1]

Objectives

1. Update vaccine coverage estimates by state, adjusting for individual characteristics
2. Develop multilevel modeling framework incorporating individual and state-level characteristics

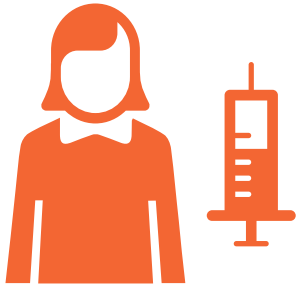


[1]La EM, et al. Hum Vaccin Immunother. 2018, 14:2, 430-41

Methods

- 2015-2017 Behavioral Risk Factor Surveillance System data

  - **Influenza:** 1 dose annually for adults aged ≥18 years
  - **Pneumococcal:** 1 dose of PCV13 and 1 dose of PPSV23 administered in series for adults aged ≥65 years
  - **Tdap:** a Td booster dose every 10 years for adults aged ≥18 years, with a single dose of Tdap in place of a decennial Td booster dose as early as possible
  - **HZ:** 1 dose for adults aged ≥60 years



Tdap, tetanus, diphtheria, and acellular pertussis; **Td**, tetanus and diphtheria; **PCV13**, pneumococcal conjugate vaccine; **PPSV23**, pneumococcal polysaccharide vaccine; **HZ**, herpes zoster

Methods

1 National and state coverage rates adjusted for individual characteristics using multivariable logistic regression

- Sociodemographic characteristics
- Health status
- Potential barriers to care
- Health care utilization

2 Multilevel regression models assessing both individual-level and state-level characteristics

- Residents on Medicaid (%)
- Medicare beneficiaries (% of total population)
- Residents uninsured (%)
- Private sector establishments that offer health insurance to employees (%)
- HMO penetration rate
- Adults without a usual place of medical care (%)
- Number of professionally active primary care physicians per capita
- Health care expenditures per capita
- State funding allocated to immunization programs (%)
- Adult IIS (i.e., state registry) participation rate
- Pharmacist vaccination authority
- Non-medical and personal exemptions for school-mandated vaccinations characteristics

✓ **VPC**
✓ **MOR**

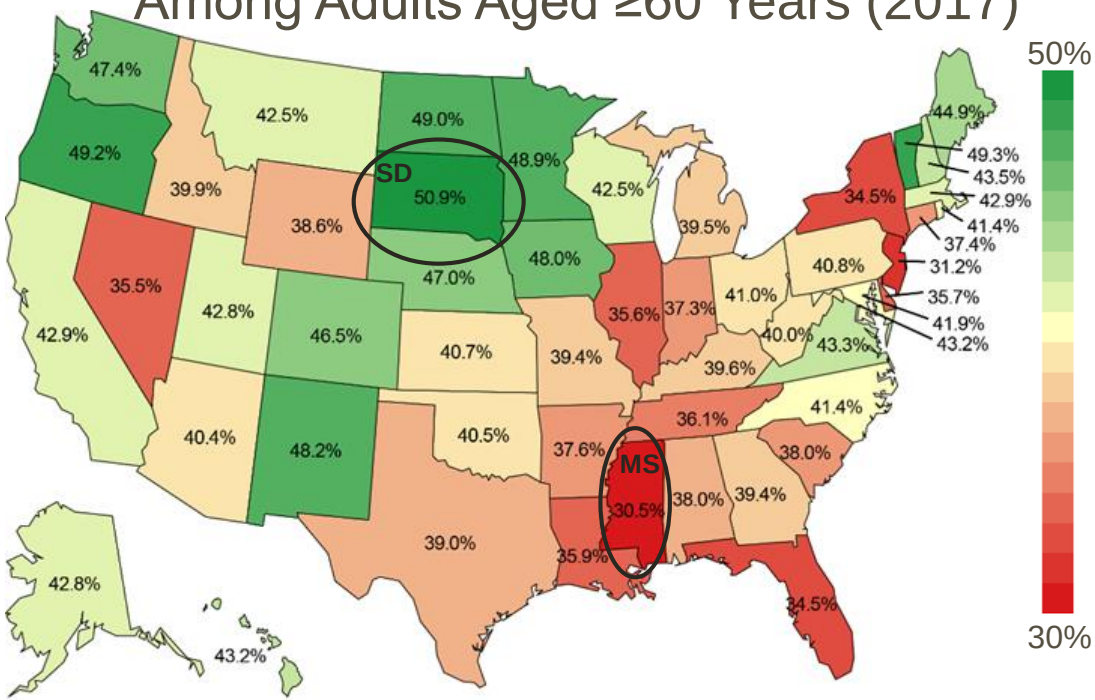
HMO, health maintenance organization; **IIS**, immunization information system; **MOR**, median odds ratio; **VPC**, variance partition coefficient

Results 1

Coverage Rates Adjusted for Individual Characteristics

Vaccine	Vaccination Coverage	
	National (%)	State Range (%)
Influenza (2017)	40	35.1–48.1
Pneumococcal (2017)	75	68.2–80.8
Tdap (2016)	33.5	21.9–46.5
HZ (2017)	40	30.5–50.9

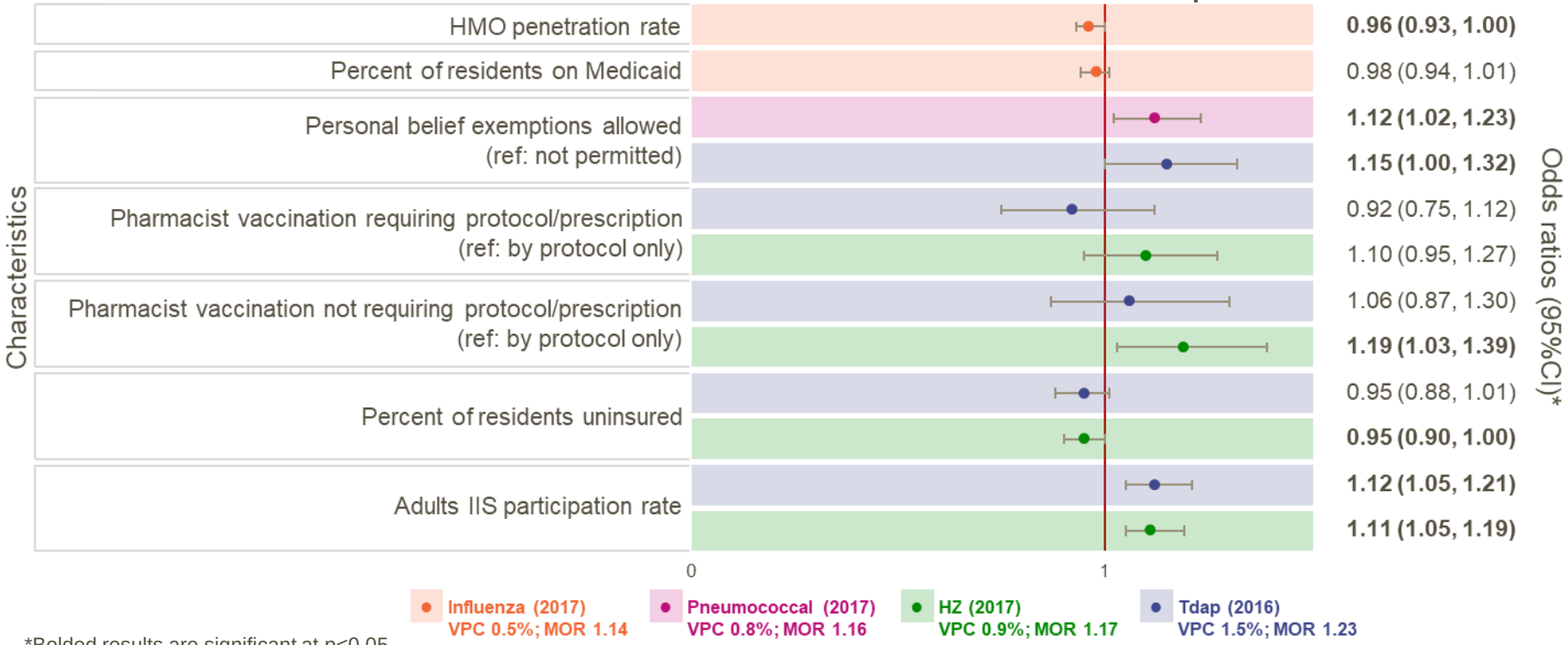
Model-Adjusted **HZ** Vaccination Coverage Among Adults Aged ≥60 Years (2017)



Tdap, tetanus, diphtheria, and acellular pertussis; **HZ**, herpes zoster; **MS**, Mississippi; **SD**, South Dakota;

Results 2 Multilevel Logistic Regressions

State-Level Characteristics Associated With Likelihood of Receipt of Each Vaccine



*Bolded results are significant at p<0.05

CI, confidence interval; **HMO**, health maintenance organization; **HZ**, herpes zoster; **IIS**, immunization information system; **MOR**, median odds ratio; **ref**, referent category; **Tdap,** tetanus, diphtheria, and acellular pertussis; **VPC**, variance partition coefficient

Conclusions

- Adult vaccination rates were still relatively low but varied across states
- Several state-level factors were associated with increased adult vaccination coverage
  - Health insurance coverage
  - Pharmacists' vaccination authority
  - Childhood vaccination exemptions
  - Adult IIS participation

- Further research needed to better explain differences between states

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