PNEUMOCOCCAL VACCINATION IN HIGH-RISK ADULTS: AN INITIAL ANALYSIS INCORPORATING SOCIAL DETERMINANTS OF HEALTH

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Background

- Progress has been made toward vaccinating older adults against pneumococcal disease, yet US vaccination rates in the high-risk population failed to meet the Healthy People 2020 goal.[1]
- Perceived vaccine hesitancy drives suboptimal vaccination but this behavior is poorly understood in adult patients.
- The impact of social determinants of health (SDoH) on pneumococcal vaccination remains largely unknown particularly in the context of the vaccine hesitancy matrix (Table 1).[2]

Table 1. Elements of the Vaccine Hesitancy Matrix

Contextual	Individual/Group	Vaccine-Specific
Communication/Media	Experiences	Administration
Leaders	Beliefs/Attitudes	Schedule
Religion/Culture	Knowledge	Cost
Socio-economic	Health system	Recommendations
Politics	Risks vs. benefits	Risks vs. benefits
Geography		Newness
Industry perception		

Objective

- Determine the influence of select social determinants of health on uptake of and time to pneumococcal vaccination among those deemed high-risk.

Methods

- Retrospective observational cohort study using IBM MarketScan Commercial Claims and Encounters databases, 2013-2016
- Eligibility:
  - Adults aged 18-64 years
  - Continuously enrolled for 2 consecutive years over 2013-2016
  - First diagnosis for a condition placing the patient at high-risk of invasive pneumococcal disease: HIV/AIDS, cochlear implant, cerebrospinal fluid leak, chronic heart disease, COPD, chronic lung disease, diabetes, alcoholism, chronic liver disease, renal failure, nephrotic syndrome, cancer, solid organ transplant, current smoker[3]
- Select social determinants of health from publicly-available sources were linked by metropolitan statistical area: voting records, poverty, health literacy, Internet access .[4-6]
- Logistic regression assessed the impact of SDoH on pneumococcal vaccination and linear regression assessed time to vaccination, controlling for demographics and health resource utilization.

Results

Table 2. Patient demographics

Characteristic	Vaccinated N (%)	Not Vaccinated N (%)
Total	43,924 (25.2)	129,798 (74.8)
Age		
18-24	2,010 (4.6)	7,289 (5.6)
25-34	3,145 (7.2)	11,759 (9.1)
35-44	6,631 (15.1)	23,898 (18.4)
45-54	12,957 (29.5)	41,595 (32.0)
55-64	19,181 (43.7)	45,247 (34.9)
Male	20,211 (46.0)	60,835 (46.9)
Region		
Northeast	6,646 (15.1)	17,539 (13.5)
North Central	10,568 (24.1)	29,043 (22.4)
South	19,464 (44.3)	63,792 (49.2)
West	7,114 (16.2)	19,182 (14.8)
Rural	5,416 (12.3)	18,450 (14.2)
Plan Type		
Comprehensive	1,951 (4.4)	5,806 (4.5)
EPO/PPO	25,835 (58.8)	79,994 (61.6)
HMO	5,914 (13.5)	16,366 (12.6)
POS	3,134 (7.1)	9,176 (7.1)
CDHP/HDHP	6,312 (14.4)	16,009 (12.3)
Immunocompromised	2,178 (5)	5,405 (4.2)
Qualifying Condition*		
HIV/AIDS	239 (0.5)	287 (0.2)
Cochlear implant	4 (0)	7 (0)
Cerebrospinal fluid leak	4 (0)	13 (0)
Chronic heart disease	7,363 (16.8)	22,968 (17.7)
Chronic lung disease	14,240 (32.4)	36,712 (28.3)
Diabetes	1,098 (2.5)	3,035 (2.3)
Alcoholism	321 (0.7)	901 (0.7)
Chronic liver disease	2,387 (5.4)	6,890 (5.3)
Renal failure	2,903 (6.6)	7,899 (6.1)
Nephrotic syndrome	47 (0.1)	131 (0.1)
Malignant cancer	566 (1.3)	1,851 (1.4)
Solid organ transplant	403 (0.9)	856 (0.7)
Current smoker	14,349 (32.7)	48,238 (37.2)

*Not mutually exclusive
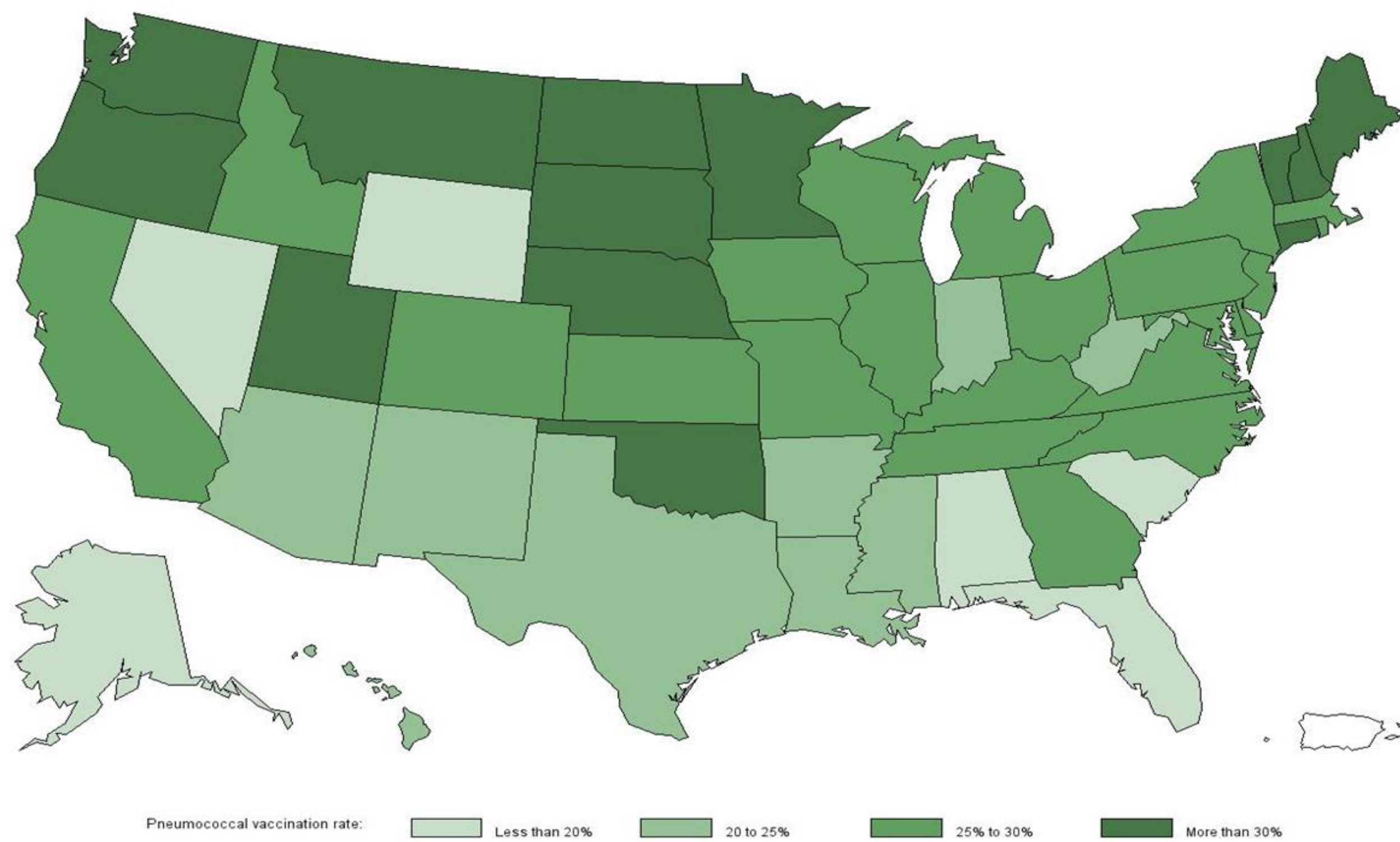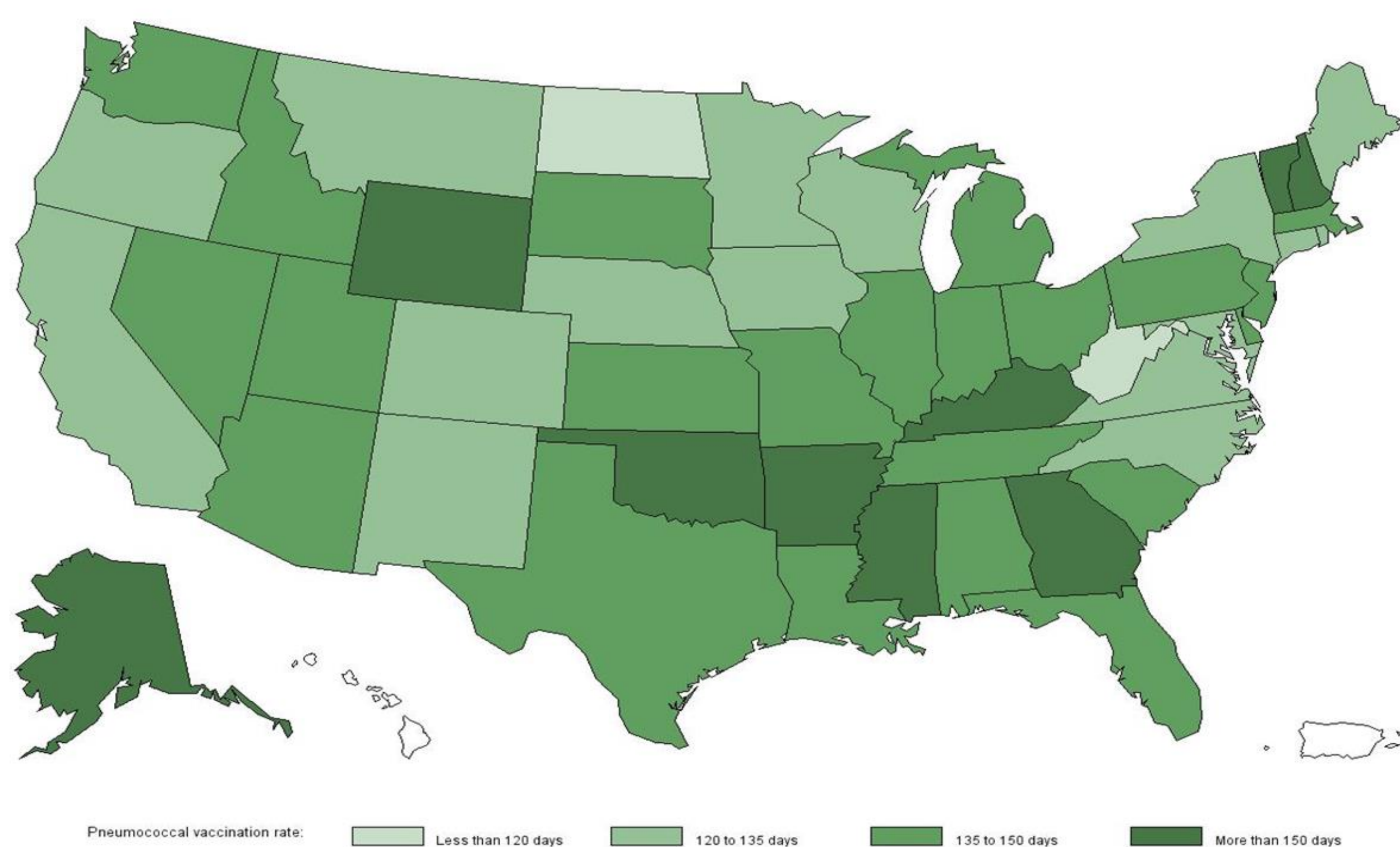All p<0.01

Figure 1. Pneumococcal vaccination by state

Pneumococcal vaccination rate: Less than 20% | 20 to 25% | 25% to 30% | More than 30%

Figure 2. Days to pneumococcal vaccination post-diagnosis

Pneumococcal vaccination rate: Less than 120 days | 120 to 135 days | 135 to 150 days | More than 150 days

- Approximately ¼ of those identified (25.2%) were vaccinated in the first year after being deemed high-risk (Table 2)
- Proportions vaccinated increased with age, and were higher in females, those immunocompromised, and enrollees of high-deductible plans.
- Proportions vaccinated ranged from 10.7% (Nevada) to 38.5% (New Hampshire) (Figure 1)
- Median time to vaccination: 138.5 days (Figure 2); range: 106.8 (North Dakota) to 158.3 (Mississippi)

Table 3. Odds of and time to pneumococcal vaccination

Characteristic	Odds	Days
	Odds Ratio (95% CI)	B (SE)
Poverty	0.16 (0.079-0.311)**	8.3 (29.07)
Health literacy	1.014 (1.011-1.017)**	-0.13 (0.14)
Democratic voters	1.28 (1.066-1.529)**	-10.1 (7.67)
Limited Internet access	0.17 (0.076-0.374)**	68.9 (34.34)**
Urban*	1.30 (1.246-1.353)**	-8.2 (1.78)**
No Influenza vaccination	0.05 (0.047-0.050)**	-1.4 (1.37)

Models controlled for age, sex, region, plan type, immunocompetency, and resource use
*Separate model run for population density due to lack of SDoH values in rural areas
**p<0.005

Conclusions

- Certain social determinants of health are important factors of vaccine uptake, particularly related to access to information and health services.
- Efforts to improve vaccination rates should consider the role of non-clinic entities that are currently underutilized.

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