

# Investigating Barriers to Vaccination Among Durham County's Vulnerable Populations

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**BACKGROUND** As antivaccination movements increase in the United States, underlying structural barriers to vaccination are often ignored. This study examines barriers to vaccination in an adult population to uncover factors leading to vaccination rates in underserved populations.

**METHODS** This study was approved by the Duke University Campus Institutional Review Board. Fifty-four patients at the Adult Immunizations Clinic of the Durham County Department of Public Health were interviewed throughout June and July 2019. Subjects were enrolled on a voluntary basis followed by oral consent. Eligible subjects included English-speaking adults receiving vaccines aged 19 or older. Anonymous and confidential interviews were conducted verbally.

**RESULTS** This study found that a large proportion of study participants were referred by their provider to receive vaccines at the health department. It was also found that having a provider appeared to lead to a decrease in vaccine hesitancy. Enhanced patient understanding of vaccines was not necessarily contributing to the apparent decrease in vaccine hesitancy. Patients who understood the importance of public health had the same rate of vaccine hesitancy as those who had no reason for receiving vaccines.

**LIMITATIONS** External validity is limited due to small sample size.

**CONCLUSIONS** Health care providers may play an essential role in reducing vaccine hesitancy. However, increases in vaccine uptake due to provider-level interventions may not necessarily be due to an enhanced understanding of vaccines or their importance to public health.

Over the last two decades, mistrust of vaccination has inundated health care clinics as patients lose trust in the scientific community and health providers grow frustrated with their patients' decisions about vaccines [1]. The conflict has led to the rise of nationwide anti-vaccination efforts exacerbated by the current political climate and has provoked regional measles outbreaks in Washington state and northwest Oregon [2].

While most US citizens do receive their recommended vaccinations [3], those who do not vaccinate have cited falsified reports of autism and a distrust of government policies as their primary concerns [3]. Technical solutions such as mandatory school and employment vaccination have been introduced to address this threat to public health [4, 5]. However, they often fall short in the face of religious exemptions and a general distrust of policies that are perceived as forcing citizens to behave a certain way [3]. Consequently, policymakers and members of the scientific community are now recognizing that anti-vaccination attitudes constitute a challenge deeply embedded in social decisions and social determinants of health [6].

Currently, parents of children and adolescents appear well-incentivized to receive vaccines because of school requirements. Fifteen states permit personal exemptions for vaccinating children, and parents often must go through a series of approval steps for a personal exemption: obtaining a signature from a local health department official and renewing their exemption form every year [7, 9]. These incentives for vaccination uptake and barriers to vaccine exemption contribute to ~70% vaccination coverage rate

among children, for example. [8].

Adult vaccination, by contrast, is limited. Less than two-thirds of adults aged 65 or older have ever had a pneumococcal vaccine and slightly more than one-third have ever had a shingles vaccine [10]. Vaccination coverage among adults aged 65 or older varies by socioeconomic status and race [10]. Adults aged 65 or older with lower socioeconomic status and of non-white race are less likely to receive the influenza vaccine [10]. While most efforts to overcome vaccination hesitancy have focused on improving vaccination rates among children and adolescents, a closer look at barriers and facilitators to vaccination in the adult population may reveal barriers to vaccination when school requirements are absent.

This study focuses on structural barriers to vaccination such as who refers adult to the health department to receive vaccinations and why they chose to be vaccinated. This study seeks to understand whether adults are hesitant to receive vaccines and any reasons for that hesitancy. Durham County was chosen because of its substantial low-income population and racial diversity in an effort to uncover barriers in an ostensibly higher need population [11].

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## Methods

This study was approved by Duke University Campus Institutional Review Board. Throughout June and July 2019, we interviewed patients seeking vaccines at Durham County Department of Public Health's (DCDPH) Adult Immunizations Clinic (AIC). Eligible subjects were English-speaking adults receiving vaccines at AIC aged 19 or older. Patients were either notified of the study by clinic staff or approached by the researcher with study information. Participants were enrolled voluntarily using informational fliers and a verbal description of the study followed by brief screen and verbal consent. Following a vaccination, surveys were conducted in-person and in English by the same trained interviewer in private clinic space to ensure data was kept anonymous and confidential. The same interviewer primarily analyzed the data and categorized the responses to open-ended questions with iterative co-author discussions. Analysis was completed using Microsoft Excel for data management and analyses.

The survey was designed with input from DCDPH leadership and composed of both open-ended and closed-ended questions focusing on two primary areas of interest: 1) identification of specific structural barriers to vaccination (e.g., health care system's availability and accessibility for vaccinations) and 2) personal reasons for any vaccination hesitancy in the past. Closed-ended questions asked participants why they received vaccinations at the health department and how they knew to receive vaccinations at the health department. Additional closed-ended questions asked patients whether they have a regular provider, if their regular provider explained the importance of vaccinations, and whether the patient felt as if they had sufficient time to discuss whether vaccines were important with their provider. A final set of closed-ended questions asked participants if they knew when they were scheduled to receive their next set of vaccinations, if they knew of alternative places where they could receive vaccinations, and if they had ever considered not receiving vaccinations for themselves. All closed-ended questions were asked in such a way that respondents were presented with a limited list of options from which they were required to choose. Additional closed-ended demographic questions were also asked of participants.

Open-ended questions asked patients to briefly describe in their own words how vaccinations work, why patients believed they should receive vaccinations, and, if patients had a regular provider, why they did not receive a vaccination from that provider. For all open-ended questions, we let the patient respond in their own words without a limited list of options. The responses were then categorized.

For the open-ended question designed to gauge patient understanding of how vaccines work, we categorized the data into three levels based on the responses received. Responses indicating a basic understanding that vaccines are preventive in the long-term but with no mention that

vaccines specifically introduce a "weakened form of virus" were categorized as *Level 1*. Responses that specifically mentioned that vaccines introduce a "weakened form of virus" but without any mention of antibodies or adaptive immunity were classified as *Level 2*. Responses that specifically indicated how a vaccine induces the body to create "antibodies" that provide long-term immunity were classified as *Level 3*.

Similarly, for the open-ended question designed to understand patients' personal motivations for receiving vaccinations, responses were characterized into three categories: 1) no reason/doing it for a requirement; 2) personal health; 3) public health. Responses that mentioned specifically that the patient had "no reason" or was receiving the vaccine solely for any "requirement" without mention of personal health or public health were categorized as 1) no reason/doing it for a requirement. Responses that in any way mentioned that the vaccine protects the patient's personal health without any mention that vaccines also protect public health were classified as 2) personal health. Responses that in any way mentioned that vaccines prevent others or the public from contracting disease were organized as 3) public health.

For the open-ended question seeking to understand if patients have a regular provider, and why they did not receive a vaccination from their provider, we organized the responses into the following categories: 1) provider did not supply the vaccine; 2) the vaccine was too expensive; 3) vaccine records were better organized at the health department; 4) patient was referred from maternal health division of the health department; 5) patients were referred from TROSA (not-for-profit social service organization); 6) patients already knew about the AIC at the health department.

## Results

Approximately 70 patients were approached yielding 54 patients consented and interviewed. The interview length was approximately 10 minutes. Table 1 details the sample's characteristics. Several themes emerged on a question-by-question basis and cross-correlational basis.

### Demographics

Nearly half of interviewees self-identified as African American with white and Hispanic interviewees constituting 18% and 20%, respectively. Most interviewees did not have insurance or had Medicaid, and 30% of the interviewees were eligible for social security or food stamps, per self-report. While most interviewees spoke English as their first language, Spanish was the second most commonly spoken language. Only English interviews were conducted. Most patients were aged 26-50, and 20% of those interviewed were employed as health care workers.

### Structural Barriers to Vaccination

*Who refers adult patients to the health department to receive vaccinations and why do they refer their patients?* Table 2 contains the survey frequency distribution for the

**TABLE 1.**  
**Baseline Characteristics (N = 54)**

<b>Ethnicity</b>	
Black or African American	26 (48.1%)
White	10 (18.5%)
Hispanic or Latino	11 (20.4%)
Asian	3 (5.6%)
Other/Mixed	4 (7.4%)
<b>Gender</b>	
Male	38 (38.9%)
Female	21 (61.1%)
<b>Medical Insurance</b>	
No Insurance	32 (59.3%)
Medicaid	12 (22.2%)
Blue Cross Blue Shield	5 (9.3%)
Other	5 (9.3%)
<b>Social Security/Food Stamps Eligibility</b>	
Yes	16 (29.6%)
No	38 (70.4%)
<b>Primary Language</b>	
English	41 (75.9%)
Spanish	10 (18.5%)
Other	3 (5.6%)
<b>Age</b>	
Adult 19-26	20 (37%)
Adult 27-50	23 (42.6%)
Adult >50	11 (20.4%)
<b>Status</b>	
Pregnant Woman	8 (14.8%)
Healthcare Worker	10 (18.5%)
Immigrant	7 (13%)

sample. In closed-ended survey questions, 30% of study participants were referred to the AIC by their provider, 17% were referred from the maternal health/family planning division of the health department, 15% were referred from TROSA, 11% were referred from their job, 15% were referred because of a school enrollment requirement, and 17% had various other personal reasons for receiving vaccines. Most referrals were either from a prominent federally qualified health center or nearby university hospital-affiliated clinics. While 39% of patients knew to receive vaccines at the AIC because of a local provider referral, others were referred by TROSA (not-for-profit social service organization) (15%), their job (11%), or the internet (9%), and 26% already knew about the health department option. Eleven percent of patients knew to receive vaccines at the AIC through their employer or family members. Additionally, 64% of patients who had a regular provider did not receive a vaccine from that provider because the provider did not supply the vaccine they needed (*P*-value not available).

With respect to the closed-ended demographic questions, we found that 38% of African American participants were referred by their provider to the health department, versus 20% of white participants and 18% of Hispanic

participants (*P*-value not available). This study also found that 33% of patients who had Medicaid and 25% of patients who had no insurance were referred by their provider to the health department.

We also investigated whether having a regular provider makes a difference in where else a patient will look to find vaccinations [4]. This study found that patients who do not have a regular provider more frequently use the hospital emergency services or the local federally qualified health center versus potentially more cost-effective alternatives such as walk-in vaccination clinics and pharmacies.

In summary, provider referral is solely addressed by closed-ended questions and indicates that when patients sought vaccinations, providers of patients included in this study disproportionately referred African American adult patients who had Medicaid or no insurance to the health department.

***Are patients hesitant to receive vaccines and what are reasons for that hesitancy?*** In closed-ended questions, we found that the majority of patients indicated that they did not have a regular provider. Forty-one percent of patients who did not have a regular provider were hesitant to any vaccine in the past (*P* = .35). This is in comparison to only 32% of patients who did have a regular provider and were hesitant to any vaccine in the past (*P* = .07). This study also asked patients whether a provider ever explained to them why vaccines are necessary and found that over half of the respondents answered no. We found that 41% of patients whose providers did not explain the importance of vaccines were hesitant to obtain any vaccine in the past (*P* = .35). This contrasted with 27% of patients whose providers explained vaccine importance, but they were still hesitant toward any vaccine in the past (*P* = 0.3).

Previous literature suggests that an inherent understanding of the importance of vaccination to public health could contribute to higher vaccine uptake [14]. Using open-ended questioning, this study classified interviewees' responses to the question "Do you understand how vaccines work?" into three levels [14]. Level 1 indicates that patients have a rudimentary understanding that vaccines are preventive. Level 2 indicates that patients understand the vaccine introduces a weakened form of the virus into the body to build general immunity. Level 3 indicates that patients understand concepts of antibodies and adaptive immunity.

We found that patients with Level 2 understanding of how vaccines work experienced the highest level of vaccine hesitancy (54%). Level 3 understanding of vaccines had lower level of vaccine hesitancy (29%). Patients with no understanding of how vaccines work experienced the lowest level of vaccine hesitancy at 14% (*P* = .34). This study found that the majority of African Americans and Hispanics had Level 1 understanding of vaccines while the majority of whites had a Level 2 understanding. There was not enough data to conclude a discernable difference based on race for Level 3.

**TABLE 2.**  
**Guiding Questions and Responses**

<b>1. Why did you come in today to receive vaccinations?*</b>	
Provider Referral	16 (29.6%)
Maternal Health/Family Planning Referral	9 (16.7%)
TROSA Referral	8 (14.8%)
Job Referral	6 (11.1%)
School Requirement	8 (14.8%)
Personal Reason	9 (16.7%)
<b>2. How did you know to receive your vaccines from the DCoDPH?*</b>	
Provider Referral	21 (38.9%)
Advised by Family Members	6 (11.1%)
Internet	5 (9.3%)
Job Referral	6 (11.1%)
Always Knew about DCoDPH	14 (25.9%)
TROSA Referral	8 (14.8%)
<b>3. Do you have a regular provider?*</b>	
Yes	25 (46.3%)
No	29 (53.7%)
<b>4. Did a provider explain to you why vaccines are necessary?*</b>	
Yes	22 (43.1%)
No	29 (56.9%)
<b>5. Do you feel like you have had sufficient time to discuss why vaccines are important with your provider?*</b>	
Yes	33 (63.5%)
No	19 (36.5%)
<b>6. Do you understand how vaccines work?*</b>	
Level 1 (low understanding)	27 (50%)
Level 2 (moderate understanding)	13 (24%)
Level 3 (high understanding)	7 (13%)
I do not understand	7 (13%)
<b>7. Why do you personally think you should receive vaccinations?*</b>	
No Reason/Doing it for a Requirement 10	18 (18.5%)
Personal Health	32 (59.3%)
Public Health	12 (22.2%)
<b>8. If you have a regular provider, why didn't you get the vaccination from them?*</b>	
Provider did not supply vaccine	17 (65.4%)
Vaccine was too expensive	1 (3.8%)
Vaccine records were better organized at DCoDPH	1 (3.8%)
Referral from DCoDPH Maternal Health department	3 (11.5%)
Referral from Trosa	2 (7.7%)
Already knew about Adult Immunization Clinic	2 (7.7%)
<b>9. Do you know when you are scheduled to receive your next vaccination?*</b>	
Yes	26 (48.1%)
No	28 (51.9%)
<b>10. Do you know of other places where you can receive vaccines besides DCoDPH?*</b>	
Walk-in Clinics	14 (25.9%)
Pharmacies	15 (27.8%)
Hospital Emergency Departments	4 (7.4%)
Doctor's Office	12 (22.2%)
Lincoln Community Health Center	8 (14.8%)
Do not know	20 (37%)
<b>11. Have you ever considered not receiving vaccines for yourself and why?*</b>	
Yes; Flu Vaccine	15 (27.8%)
No	34 (63%)
Other	5 (9.3%)
<b>12. Reasons for not getting the flu shot*</b>	
Concern about side effects	4 (26.7%)
Thinks flu shot is not necessary	10 (66.7%)
Disagrees on personal autonomy versus public health	2 (13.3%)
Influenced by family/friends/media	4 (26.7%)

Note. TROSA: not-for-profit social service organization <https://www.trosainc.org/about-us>; DCoDPH: Durham County Department of Public Health

\*Closed-ended Questions

\*\*Open-ended Questions

In another open-ended question, we categorized a patient's personal reason for receiving vaccines into three categories: 1) no personal reason/doing it for a requirement; 2) personal health protection; 3) assists in public health safety. This study found that those who had an understanding of the public health importance of vaccine had nearly the same degree of vaccine hesitancy (42%) as those who had no reason for receiving vaccines and were just doing it for the requirement (40%). Those seeking vaccines for personal health experienced the lowest vaccine hesitancy rate at 34% ( $P = .38$ ). Of those who understood the public health importance of vaccines, the majority were hesitant toward the flu vaccine because they felt it was unnecessary and/or were influenced by family/friends.

In conclusion, this study indicates that having a provider may reduce vaccine hesitancy, but an enhanced understanding of vaccines or the public health importance of vaccines is not correlated with this reduction in vaccine hesitancy.

## Discussion

This survey explored barriers and facilitators to vaccination among a cross-section of adults seeking vaccination from a county health department and yielded notable findings about underlying reasons adults seek vaccination. First, this study found that a large proportion of study participants were referred by providers to receive vaccines at the health department. This suggests providers play an important role in referring patients to the AIC, but also are not equipped or willing to perform vaccinations themselves. This study also found that the majority of provider referrals were for African American patients, potentially reflecting an implicit bias in provider referral of patients. However, because the majority of patients interviewed were African American, and Durham County providers could be treating a larger African American population, this result could be a consequence of system bias rather than implicit bias of provider referral patterns. We did not collect provider level data to inform referral patterns. It is unclear why providers are not vaccinating and are referring patients to the AIC to receive routine vaccinations. However, prior literature suggests that high costs of storing and administering vaccines outweighs reimbursements providers receive from vaccine administration [12, 13]. Consequently, health care providers may be disincentivized from supplying vaccines, referring patients to public health departments.

While it has been documented that providers are financially disincentivized to supply vaccines because of low reimbursement rates [12, 13], this study provides evidence that providers refer patients to the health department, and this may be financially motivated. For example, this study found that all patients who were referred to the health department by their physician either did not have insurance or were insured by Medicaid. Provider referral patterns can increase scattered vaccine uptake and could contribute to the decrease in vaccination rates particularly for adults [13].

Prior literature suggests interventions at the provider level can influence vaccine uptake [15]. For example, patient awareness and education of vaccination importance to public health could improve vaccination uptake. In this sample, we found that having a provider appeared to lead to decreased vaccine hesitancy. This study also found that for almost 50% of patients, the provider had never explained why vaccines are necessary. Patients whose providers had explained the importance of vaccines were less likely to be hesitant toward any vaccines (including flu vaccine). These findings suggest that interventions at the provider level may help to increase vaccination uptake. However, this study sought to investigate whether an enhanced patient understanding of vaccines was driving the observed decrease in vaccine hesitancy. Patients who understood the importance of public health had the same rate of vaccine hesitancy as those who had no reason for receiving vaccines other than mandate.

We hypothesize more influential variables such as family or friend recommendations may take precedence over a personal understanding of the importance of vaccines to public health [16]. This suggests that even though people understand the most important part of vaccination (public health importance), they may rely more on family/friends and still feel like certain vaccines, such as the flu vaccine, are unnecessary [16]. This could guide patient education regarding how effective the flu vaccine is year to year and how they judge the vaccine's efficacy for themselves.

These data suggest that provider-level interventions may decrease vaccine hesitancy. However, this decrease is not necessarily through an enhanced understanding of the importance of vaccines to public health. In this sample, patients appear to be more influenced by trusted family members versus personal understanding of the importance of vaccines. If patient-provider communication on this topic can be more thorough, vaccine uptake for adults may improve.

While the data collected is useful for the DCDPH to understand barriers to vaccination in this community, there are limitations to the study. The study is not statistically representative of Durham County; it was not powered for statistical analysis and therefore not generalizable to a wider population. Recruitment via a voluntary convenience sample of those seeking vaccination only during a summer study period is also limiting. Future study could involve a quantitative survey of a larger, more representative sample based, in part, on our study findings.

## Conclusion

Vaccine hesitancy and vaccine seeking is complex and likely mediated by several variables. This study suggests that the provider plays an essential role in either perpetuating vaccine hesitancy or reducing it. Provider referral to the health department could influence scattered vaccine coverage. While previous studies have demonstrated that

**TABLE 3.**  
**Cross-Correlation Results**

<b>1. Patients who have a regular provider who did not receive a vaccine from their provider because:</b>	
The provider did not supply the vaccine	16 (64.0%)
The vaccine was too expensive	9 (16.7%)
Vaccine records were better organized at DCoDPH	1 (4.0%)
Referral from Maternal Health	3 (12.0%)
Referral from TROSA	8 (14.8%)
Already knew about AIC	2 (8.0%)
<b>2. Proportion of patients by race referred to DCoDPH by their healthcare provider for vaccines:</b>	
Black or African American	10 (38.5%)
White	2 (20.0%)
Hispanic or Latino	2 (18.2%)
<b>3. Proportion of patients by insurance provider referred to DCoDPH by their healthcare provider for vaccines:</b>	
No Insurance	8 (25.0%)
Medicaid	4 (33.0%)
<b>4. Proportion of patients who have a regular provider who were (<math>P = 0.07</math>):</b>	
Hesitant to any vaccine in the past	8 (32.0%)
Not hesitant to any vaccine in the past	17 (68.0%)
<b>5. Proportion of patients who do not have a regular provider who were (<math>P = 0.35</math>):</b>	
Hesitant to any vaccine in the past	12 (41.4%)
Not hesitant to any vaccine in the past	17 (58.6%)
<b>6. Proportion of patients whose provider explained why vaccines are necessary who were (<math>P = 0.03</math>):</b>	
Hesitant to any vaccine in the past	6 (27.3%)
Not hesitant to any vaccine in the past	16 (72.7%)
<b>7. Proportion of patients whose provider did not explain why vaccines are necessary who were (<math>P = 0.35</math>):</b>	
Hesitant to any vaccine in the past	12 (41.4%)
Not hesitant to any vaccine in the past	17 (58.6%)
<b>8. Proportion of patients who were hesitant to any vaccines in the past by Level 1-3 understanding of vaccines (<math>P = 0.34</math>):</b>	
No Understanding	1 (14.3%)
Level 1	10 (37.0%)
Level 2	7 (53.8%)
Level 3	2 (28.6%)
<b>9. Proportion of patients who were hesitant to any vaccines in the past by personal reason for receiving vaccines (<math>P = 0.38</math>):</b>	
No Reason/Doing it for a Requirement	4 (40.0%)
Personal Health	11 (34.4%)
Public Health	5 (41.6%)

Note. TROSA = not-for-profit social service organization <https://www.trosainc.org/about-us>; DCoDPH = Durham County Department of Public Health

provider-level interventions such as explaining the importance of vaccines could lead to increased vaccination uptake, this study shows that this increase in vaccine uptake may not necessarily be due to an enhanced understanding of vaccines or their importance to public health. Rather it suggests that patients can be more influenced by family members and close friends over their own understanding of vaccines. These findings can guide future provider-level or health system-level interventions aimed at decreasing vaccine hesitancy that could be more effective if promoted through close kinship groups and social networks. *NCMJ*

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