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## H1N1 and Seasonal Flu Vaccination: Interpreting the College Student Survey

### Introduction

Historically, vaccination is a relatively new medical practice. While there has always been antivaccination sentiment, since the introduction of the smallpox vaccine, it seemed for awhile in mid-twentieth century America that enthusiasm for the polio vaccine had overcome vaccine hesitancy. Yet, after the initial enthusiasm in mid-twentieth century, there emerged an antivaccination movement that contributes to widespread distrust of vaccination as a medical practice. The Vaccination Research Group is interested in understanding the social and cultural contexts for this distrust and examining the themes and stories that are told in antivaccination narratives.

The H1N1 pandemic of 2009 and current recommendations that all citizens over the age of 6 months receive the seasonal influenza vaccination make college students an important group to study with respect to vaccination practices and beliefs. During the semester of fall 2010, the Vaccination Research Group conducted an online survey of Virginia Tech undergraduates, Radford nursing students, and Virginia Tech School of Medicine students concerning H1N1 and seasonal flu vaccination practices and beliefs (IRB # 10-732). The survey collected demographic information from respondents and also asked for narrative responses regarding vaccination beliefs and reasons for their practices. There were almost 540 respondents from the population.

The survey generated significant quantitative data but, interestingly, we also note significant narrative elements relating to urban legends in students' responses. Analysis of the narrative portion of the qualitative data involved coding using grounded theory methods. A number of students mentioned a popular news story and viral video of the cheerleader who developed "Dystonia," a neurological movement disorder, after receiving the H1N1 vaccination. Additionally, a few students mentioned the risk of becoming a zombie as a result of receiving this vaccine. This poster [\[link\]](#) reports on the data received from the survey with an eye toward understanding how urban legends frame antivaccination sentiments.

### Quantitative Analysis

Statistical tests were run on the survey data. We were hoping to find a trend for the reasons why people do or do not get vaccines in relation to individual factors such as socioeconomic status, education level, or personal belief systems. We predicted that higher parental socioeconomic status and education levels would be positively correlated with the choice to receive a vaccination. We also hypothesized that the area in which one resides will be a predictor for receiving the H1N1 shot. We classified these three areas into urban, suburban, and rural, and asked survey participants to pick the category they believe applies to them.

The chi-squared model was used to test our categorical data for homogeneity. We set an alpha level at .05 and ran our tests using JMP statistical software. Chi-squared values of  $p < .05$  suggested a significant relationship. If the relationship was significant, we viewed the Pearson's correlation coefficient (denoted as  $r^2$ ) to determine how strong the relationship was. +1 indicates a perfect, very strong correlation, -1 indicates a negative, very strong correlation, and 0 is defined as no correlation. All values between

-1 and +1 are possible Pearson's correlation coefficients. Our sample size was 538 and is large enough to interpret results.

Most of the factors we expected to influence one's choice to get vaccinated showed no statistical significance. **However, we did find that a person's choice to get the seasonal flu shot positively influences that same person's choice to get the H1N1 shot, although the direction of the relationship cannot be determined.** We determine this assertion via a statistically significant p value of  $<.0001$ . The r square value is .2621 and signifies a weak to moderate relationship. However, this is acceptable because we are using categorical data. Nominal data would require a person's correlation closer to positive or negative 1 to demonstrate a strong relationship. A screen shot of the actual test results are displayed below.

One might wonder what a statistically significant value means in terms of refusal or acceptance of vaccination. First, it is important to note that we cannot necessarily generalize the desire to receive the seasonal flu shot and the H1N1 shot with the acceptance of all vaccination. Considering these are the two most common vaccines and both require a certain amount of dedication (an annual injection) for immunization, we can determine that people who choose to get both the seasonal flu and the H1N1 vaccines are generally accepting of the vaccination process and believe vaccines are valuable to their health perceptions. The positive relationship suggests that one's choice to get the flu shot is correlated with one's choice to get the H1N1 shot. This could mean that vaccination refusal is not vaccine specific. Instead, there is a general acceptance or general denial of vaccination as a whole. This may imply that reasons behind vaccination beliefs are not constructed by the scientific process or development of a specific vaccination, but rather an overarching generalization of vaccination as a process.

Have you gotten a flu shot in the past two years vs. getting H1N1 shot?

**Nominal Logistic Fit for Have you gotten the flu shot in the past two years?**

**Iteration History**

**Whole Model Test**

Model	-LogLikelihood	DF	ChiSquare	Prob>ChiSq
Difference	96.45952	1	192.919	<.0001*
Full	271.55983			
Reduced	368.01934			
RSquare (U)		0.2621		
Observations (or Sum Wgts)		533		

Converged by Gradient

**Parameter Estimates**

Term	Estimate	Std Error	ChiSquare	Prob>ChiSq
Intercept	-0.7998211	0.1395909	32.83	<.0001*
Have you chosen to get the H1N1 (Swine Flu) vaccine since it became available?[No] For log odds of No/Yes	1.53742005	0.1395909	121.30	<.0001*

**Effect Likelihood Ratio Tests**

Source	Nparm	DF	L-R	
			ChiSquare	Prob>ChiSq
Have you chosen to get the H1N1 (Swine Flu) vaccine since it became available?	1	1	192.919034	<.0001*

### Discussion: Gender

A majority of the respondents were female (72%) opposed to male (28%). The nursing students and the VTCSOM students were removed from the survey data to view the gender distribution of respondents from Virginia Tech. It was found that of the remaining 500 Virginia Tech students, there were 150 male responses (30%) and 350 female responses (70%). According to the Virginia Tech Factbook Student Overview, Virginia Tech is about 58% male students and 42% female students—our survey results for Virginia Tech students (70% female and 30% male) do not even closely match these percentages (Virginia Polytechnic Institute and State University). Possible reasons for this could be that vaccine issues are more important to women, women are more often targets of vaccine education initiatives, and/or that women know more about vaccines than men do. It should be noted, however, that roughly the same percentage of males and females responded yes and no to the question, “Have you ever gotten the flu shot in the past two years?”

### Discussion: Religion

One of the most unexpected results of the study pertained to the relation of a person's religion and their decision to get vaccinated against the flu within the past year. Results from Roman Catholics and atheists indicate that they are more likely to receive the shot than not, where as the responses from those identifying as agnostic show that they are impartial, with 50 percent saying they would get the shot. Protestants, in contrast, seem less likely to be vaccinated against the seasonal flu. It is important to determine what influence religion can have on an individual's decision to vaccinate. According to Richard Eckersley', "Culture, spirituality, religion and health: Looking at the big picture," spirituality represents the broadest and deepest form of connectedness for an individual in society and "religion provides things that are good for health and wellbeing, including social support." Eckersley's article explains that religious settings are often accompanied by an extremely strong community-based culture. This increased sense of community potentiates the theory that the members of these religious networks can greatly influence each other and have a higher ethos than doctors when it comes to health related decisions. In addition, the opinions of high-ranking religious officials regarding vaccines could influence a person's views on vaccination. In 2006, Pope Benedict XVI announced his support of vaccines through his partnership with the Global Alliance for Vaccines and Immunization and his purchase of the first bond issued under the International Finance Facility for Immunization. The Pope's support might have contributed to Catholics scoring one of the highest percentages for receiving the flu shot within the past year.

### Discussion: Ethnicity

A viable conclusion regarding the impact of race and/or ethnicity on vaccination practice and beliefs was unable to be obtained due to a lack of diversity within the survey population.

### Discussion: Location

We analyzed the relationship between the area respondents came from (rural, suburban, urban) and their response to the question, "Have you ever gotten the flu shot in the past two years?" Survey participants from the rural areas responded 50% yes and 49% no; the respondents from the suburban areas were 55% yes and 45% no; the respondents from urban areas were 53% yes and 47% no. Thus, suburban students were most likely to get vaccinated. The amount that communities are exposed to ads either promoting or discouraging vaccinations, such as Jenny McCarthy and Jim Carrey's "Green Our Vaccines" slogan, is another plausible factor that might influence an individual's perception on getting vaccinated. There is a possibility that rural communities have less education about vaccination and lower levels of antivaccination sentiment, resulting in less discourse on vaccination as whole. With this theory in mind, it would be fair to say that living in an urban area would produce the opposite effect, increasing vaccination education but also increasing the number of antivaccination movements. This leaves suburban residents with the possibility of receiving high amounts of pro-vaccination education, but a low susceptibility of confronting negative ideas toward vaccination, therefore increasing their overall percentage of having positive perceptions toward vaccines. The varying degrees of percent vaccinated in the three locations may also show the amount of influence a community has over an individual's decision to get the flu shot, as discussed previously with religious

influence. A greater amount of research into this is necessary, both to assess statistical significance and determine causality.

#### Discussion: Parental Education Status

The survey also questioned respondents on their parents' education to see if there is a relationship between the education level of a parent and its influence on young adults decision to get vaccinated. The more educated the father was the more likely the respondent was to have received the flu shot in the past year, unless the father had a post graduate degree This trend was also observed with the mothers. Overall, it appeared that regardless of the father's education, the majority of respondents said "yes" to getting vaccinated. This was not the case with mothers--a majority of respondents saying "yes" to getting vaccinated was only seen when the mother was a college graduate, this majority peaking when the mother had some post-grad degree. This number dropped slightly when the mother's education was a post-grad degree. Thus, it seems that the mother's level of education had a higher impact on whether or not the individual was to get vaccinated, opposed to the father. A possible reason for this could be the media's targeting of women in vaccination images--we found many images of vaccination propaganda targeting women and mothers specifically, but none targeting only men and fathers. Ultimately, these findings question whether the vaccination discourse should be concentrated on women more than men, to receive a higher percentage of vaccinated individuals in the total population.

#### Discussion: Age

The age range in this survey was not comprehensive enough to come to any specific conclusion. It is important to remember, however, that the majority of the age

range, 18 – 23, is part of the future generation of parents and their beliefs about vaccination will carry on to their future families and children.

**References:**

Virginia Polytechnic Institute and State University. *Factbook: Student Overview*. Virginia Tech. 2010-2011. Web. 9 April 2011.