Influenza Vaccination Rates, Perceptions, and Vaccine Hesitancy in K-12 Teachers and Staff

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Abstract

BACKGROUND: Vaccination misinformation can contribute to vaccine hesitancy and decreased vaccination. Previous influenza immunization events at various K-12 schools carried out by Idaho State University L.S. Skaggs College of Pharmacy have noticed a small turn out of teachers and staff getting immunized during these events. Given the prominent role that teachers/staff serve in communities, we surveyed K-12 teachers and staff to determine their perceptions, knowledge, and reasons surrounding vaccine hesitancy. Our survey focused on the influenza vaccine, but also inquired about vaccine knowledge in general. *METHODS*: A Qualtrics survey was distributed online throughout the West Ada School District, located in southwestern Idaho. Demographics, receipt of influenza vaccine, vaccination motivation, knowledge and reasons for hesitancy were collected. Surveys were distributed July 2020 and analyzed using descriptive statistics. Response differences between those who most recently received their influenza vaccine and those who did not were also compared using chi-square or Mann-Whitney U tests when appropriate. RESULTS: A total of 503 surveys were completed, with all respondents teaching throughout the K-12 curriculum. A majority of respondents (n=409;81%) received a yearly influenza vaccination. Reasons for vaccination included: avoidance of flu, reduction of spread, and prevention of complications. Reasons against vaccination included: lack of efficacy, side effects, and numerous "other" responses. When comparing general influenza vaccine knowledge between those who received their influenza vaccine vs. those that did not, those who had been vaccinated displayed responses that more closely coincided with scientific data. *CONCLUSIONS:* The majority of surveyed K-12 teachers/staff received their influenza vaccine during the 2019-2020 season. However, ~20% of teachers/staff are still hesitant due to misinformation regarding vaccinations. Resources and partnerships between health organizations and school districts may increase vaccine acceptance.

Key words: School Health; Influenza; Immunization; Vaccination Hesitancy; Public Health

INTRODUCTION

For a number of years, Idaho State University's L.S. Skaggs College of Pharmacy Operation Immunization previously worked with various school districts throughout the state of Idaho to immunize teachers and staff with yearly influenza (flu) vaccinations. In addition, various community pharmacies and provider offices offer vaccination clinics to assist in increasing vaccination rates within the state of Idaho. However, even with continued efforts to improve immunizations, only ~40% of adults residing in Idaho receive their flu vaccine.[1] Prior to the 2018-2019 season, adult vaccination rates were <40% with vaccination rates increasing beginning the 2018-2019 season. The coronavirus disease-2019 (COVID-19) pandemic put vaccinations at the forefront of many discussions and debates which also highlighted widespread vaccine misinformation (false information) and vaccine hesitancy. Vaccine hesitancy can be defined as "delay in acceptance or refusal of vaccines despite availability of vaccine services." [2,3]

Teachers are often seen as trusted individuals in society. In 2020, Americans had increased their rating of grade-school teachers in honesty and ethics, potentially due to greater appreciation for their community role during the COVID-19 pandemic.[4] Teachers and those working in the education sector are essential to society's infrastructure and were also prioritized during COVID-19 vaccine distribution phases.[5] Given potential close contacts in the school setting, spread of infectious diseases are of concern.

School personnel play pivotal roles in students' lives through education and role-modeling, and in facilitating their community's health. Thus, the purpose of this cross-sectional study was to identify school personnel's views regarding vaccination status, perceptions, misconceptions, barriers and sources of information as they relate to yearly flu vaccination. Differences between those who received their flu vaccination to those who did not were also compared.

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METHODS

Participants

Eligible participants included all K-12 school personnel and staff working in the West Ada School District. The West Ada School District is located in an urban part of southwest Idaho and is the largest school district in the state.[6] During the 2020-2021 school year, it employed approximately 2,200 individuals.

Instrumentation and Procedure

This was a cross-sectional survey study. The survey was developed, administered and collected using Qualtrics XM (Provo, UT). The survey included approximately 20 items (questions) and collected information on: respondent demographics, receival of a 2019-2020 flu vaccine, motivations

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to receive or avoid a flu vaccine, general knowledge of flu vaccines, sources for vaccine information, receival of self and family childhood and adult vaccines, and beliefs regarding vaccine mandates. While other surveys were reviewed to inform survey development, the survey and its included questions were not validated.

Item format consisted of multiple choice (including one and multiple answer options), Likert scale, ranking and short answers. Only one item, "Did you receive the flu vaccine during August 2019 - March 2020?", required a response in order to continue the survey. Individuals who did not complete all five demographic items or did not navigate to the last survey page (required to receive the gift card incentive) were excluded from data analysis.

The survey link was disseminated via email to West Ada School District teachers and personnel. The survey was open from July to October 2020. Grant money received from the Idaho Immunization Coalition (IIC) was used to incentivize survey participation; those who completed the survey were eligible for a draw to win one of ten $75 Amazon gift cards.

Dissemination of the survey was performed via the West Ada Health Services Department. The Health Services Supervisor, who became our point of contact, reviewed, approved and distributed an electronic link to the survey to West Ada School District faculty and staff. The survey link was made available on July 13, 2020 and stayed open until October 21, 2020. A follow-up email was sent on July 27, 2020 to the West Ada Health Services Department to send a reminder email to teachers and staff requesting them to complete the survey. A final reminder email was sent out on October 14, 2020, one week prior to the close of the survey. Closure of the survey was October 21, 2020. From July 13 to October 21, 2020, 503 individuals from the West Ada School District completed the online survey.

Data Analysis

As previously stated, all participants who answered all demographic items and navigated to the last survey page were included in data analysis. Data was evaluated using descriptive statistics (Qualtrics XM, Qualtrics, LLC, Provo, UT; Microsoft Excel 2019, Microsoft, Redmond WA). Differences between those who most recently received their flu vaccine and those who did not were compared using chi-square or Mann-Whitney U tests, for nominal and ordinal data, respectively. Values ≤0.05 were considered statistically significant (JMP v15, SAS Institute, Inc., Cary, NC).

RESULTS

The survey was started by 514 respondents, but 11 did not meet inclusion criteria thus excluding them from further data analysis. The majority of individuals completing the survey were ≥ 31 years of age (90.7%), female (87.5%), and of White ethnicity (97.0%). All respondents were college educated and taught throughout the K-12 curriculum (**Table 1**).

Of the 503 respondents included in data analysis, a total of 409 (81.3%) reported to have received a flu vaccine during the 2019-2020 season. The motivations associated with getting vaccinated were to avoid getting the flu (95.6%, n=391), passing the flu to someone else (59.7%, n=244), and possible complications associated with the flu (49.4%, n=202) (**Figure 1**). "Other" responses included provider/health care professional recommendation, desire to stay healthy and/or decrease symptoms if infected, convenience (flu shot clinics at their school/workplace), civic responsibility/"right thing to do", and/or desire to be an example for others. In addition, a majority of these individuals received a flu vaccine during a scheduled vaccine clinic at their school of employment (78.5%). Other sites for vaccination included a doctor's office (14.2%), pharmacy (5.9%), or vaccine clinic not based within their school (1.5%).

Ninety-four respondents (18.7%) reported not receiving a flu shot during the 2019-2020 flu season. There were numerous reasons stated for not getting vaccinated. The main reasons included the belief that vaccination is not effective in preventing the flu (36.2%), side effects associated with vaccination are presumed to be worse than contracting the flu (26.6%), fear of needles (10.6%), preference for other countermeasures (dietary, complementary and alternative medicine, etc.) (10.6%), current immunity would prevent the flu (7.4%), allergy to vaccine components (5.3%), hearing or reading negative reports associated with the vaccine (4.3%), medical exemption (3.2%), religious beliefs (2.1%) and the perceived cost associated with receipt of the vaccine (1.1%) (**Figure 2**). "Other" write-in responses most often included no perceived need (particularly related to being healthy), inconvenience and lack of time to get vaccinated, lack of belief in effectiveness (particularly related to included strains), concern for ingredients and safety, lack of insurance coverage, and contracting the flu (believed to be from a flu vaccine).

Respondents who reported not receiving a 2019-2020 flu vaccine were also asked, "What would motivate you to get the flu vaccine?". Answers included "nothing" (35.1%; no response [NR]=3), increased effectiveness (33.0%; NR=3), less side effects (20.2%; NR=3), better access/convenience (17.0%; NR=3), "other" (13.8%; NR=3), contact with vulnerable populations (10.6%; NR=3), removal of thimerosal (4.3%; NR=3), and lower cost (3.2%; NR=3). "Other" responses for motivators included similar themes as seen with reasons for not receiving the vaccine. Of note, one respondent stated "experiencing a pandemic has motivated me to get my shot this year regardless of my fear of needles. I'll suck it up to protect our immunocompromised community".

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To evaluate general flu vaccine knowledge, respondents were asked to choose their level of agreement (using a five-point Likert scale), towards statements regarding flu vaccines and flu prevention. Those who had been vaccinated displayed responses that more closely coincided with scientific data related to each item (**Table 2**). When comparing the responses from both vaccinated and unvaccinated groups, there were statistically significant differences between the groups in regard to all seven items ($P < 0.05$).

A majority of the respondents reported that they received all of their recommended childhood vaccines (n=490; 97.4%; NR=1). Of the group that had received the 2019-2020 flu vaccine, one individual answered "No" to the receival of all their childhood vaccines (0.2%) and nine individuals answered "Unsure" (2.2%). Of the group that had not received their 2019-2020 flu vaccine, two individuals answered "No" (2.1%) and no respondents selected "Unsure". Differences between groups were not statistically significant (p=0.0513).

When asked if they had received all of their recommended adult vaccines, 383 of the individuals reported that they had (76.1%; NR=2). A portion of total respondents were unsure if they had received all adult vaccines (18.3%; NR=2), and 26 respondents reported they had not received all recommended vaccines (5.2%; NR=2). There were statistically significant differences (p<0.0001) for receipt of adult vaccines between those who had and had not received a flu vaccine during the 2019-2020 season with (81.7% vs 52.1%, respectively; NR=2).

Respondents were also asked if any vaccines were intentionally avoided or if there was a plan to avoid them in the future. Of the 501 respondents to this item, a majority answered "No" (85.1%; NR=2). Only 37 individuals within the 2019-2020 flu receival group were avoiding or planning to avoid any vaccines (9.0%; NR=2), compared to 36 individuals within the group that had not received their flu vaccine (38.3%). Differences between groups were statistically significant (p<0.0001).

All participants were asked which vaccines they have or plan to avoid in the future and the reasons why (this was an open-text response). Of the group that had received a 2019-2020 flu vaccine, the COVID-19 (5.1%; NR=2) vaccine had the highest response followed by shingles (1.71%; NR=2), human papillomavirus (HPV) (0.49%; NR=2) and pneumonia (0.49%; NR=2). Other vaccines with lower response rates included tetanus (0.24%; NR=2), yellow fever (0.24%; NR=2), chicken pox (0.24%; NR=2), smallpox (0.24%; NR=2), and anthrax (0.24%; NR=2). No additional information was given regarding reasons for the avoidance of indicated vaccinations.

Vaccines avoided or planned to be avoided in the group that had not received a flu vaccine between 2019 and 2020 included flu (21.2%), COVID-19 (9.5%), HPV (5.3%), "all vaccines" (3.2%), shingles (2.1%), tetanus (1.1%), and chicken pox (1.1%). At the time of this survey distribution in 2020, no COVID-19 vaccines were yet available, but were still mentioned by a proportion of the respondents as their availability was anticipated.

A majority of total respondents reported not knowing anyone who has had an adverse reaction to a vaccine (76.3%; NR=2). A write-in option was given for those to detail the adverse reactions they had heard from others. Some of the most commonly cited adverse reactions included commonly known reactions to vaccines such as mild flu- and cold-like symptoms and localized injection-site reactions. Additional responses reported as adverse reactions from vaccinations included Guillain-Barre, Autism Spectrum Disorder, allergic reactions, contraction of the flu from a flu vaccine, and autoimmune conditions. There was a greater percentage of those who knew someone who had an adverse reaction to a vaccine in those who had not received the 2019-2020 flu vaccine vs. those that had (41.5% and 19.6%, respectively; p<0.0001; NR=2).

Two survey items asked if respondents believe that certain occupations should be required to receive all recommended vaccines and for which vaccinations. Of all respondents included in the analysis, 346 believed that certain occupations should be required to receive all recommended vaccinations (68.8%, NR=2). There were statistically significant differences (p<0.0001) between belief in vaccine mandates for those that did and did not receive a 2019-2020 flu vaccine (75.5%; NR=1 and 39.4%; NR=1, respectively).

Many individuals who were against vaccination mandates cited personal liberties and autonomy as the primary reasons for not believing in this requirement. The cohort of respondents that had received a flu vaccine, as a whole, responded that the following occupations should be required to receive all recommended vaccines: healthcare workers (73.3%; NR=46), school teachers and staff (69.4%; NR=46), childcare workers (68.9%; NR=46), all people (36.2%; NR=46), and other (16.3%; NR=46). A number of respondents included "other" write-in text; responses suggested that they believed people, regardless of profession, should have the option to choose, present a medical exemption, or stated that no specific occupation should have required vaccination mandates.

Respondents who did not receive a 2019-2020 flu vaccine believed various professions should be vaccinated, such as: healthcare workers (41.5%; NR=24), school teachers and staff (28.7%; NR=24) and childcare workers (30.9%; NR=24). Only 12.8.2% (NR=24) believed all people should be vaccinated. Approximately a third of respondents (31.9%; NR=24) stated that no occupations should be required to receive vaccines based on personal choice or if the individuals are service workers.

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DISCUSSION

Overall, it was encouraging to see that the majority of school personnel received a flu vaccine during the 2019-2020 season. More than three-quarters (78.5%) of individuals surveyed reported receiving their vaccine at a school-based clinic, indicating the importance of convenience and accessibility. Of note, most recent national data (2020-2021) on settings of flu vaccination administration indicate that 8.6% of adults receive their vaccine at the workplace.[1]

Workplace vaccine clinics counter vaccine hesitancy by making vaccination conveniently accessible. One model of vaccine hesitancy acknowledges 3Cs: confidence, complacency, and convenience.[3] The significant differences seen in all flu and vaccine perception statements indicate differences in confidence and complacency between those who did and did not receive a flu vaccine. Confidence includes trust in the effectiveness and safety of the vaccine, as well as the delivery system and decision-makers who call for vaccinations. Complacency addresses perceived risks of disease and necessity of vaccination in preventing illness.

Project team members used information gathered from the administered surveys and developed an educational website to give further guidance on how teachers and staff can be vaccine advocates through motivational interviewing techniques to promote positive conversations among their peers who may be vaccine hesitant. It was also developed to educate about vaccine development and myths/truths surrounding vaccine information. These modules were available for teaching staff and school personnel.

Vaccine mandates have been a big conversation topic with many individuals holding strong views for all sides. Historically, all states have required a minimum vaccination requirement for students, with specific vaccines dependent on the state and school district.[7] However, all states consider medical exceptions, and some also consider religious and philosophical exceptions.[8] Idaho has the highest percentage of student vaccine exemptions amongst US states.[9]

Our results showed a higher percentage of vaccination compared to studies conducted in rural Georgia (2009-2010 flu season, n=29/57, 51%) and suburban Ohio (2012-2013 flu season, n=238/412, 58%).[10,11] Of important note, beliefs and intentions around vaccination (against flu and other diseases) are very dynamic so comparisons across years, geographical locations, and settings are difficult.

To enhance vaccination practices, the CDC offers resources to promote vaccination in the workplace, including specific resources for hosting a vaccination clinic.[12] In this instance, the West Ada School District partnered with Unity Health and students from Idaho State University L.S. Skaggs College of Pharmacy to offer workplace vaccinations at schools. Unity Health is a local health center that offers urgent and family care services. This partnership allowed for various staff, teachers, and other family members such as spouses and children to receive their annual flu vaccine. Other school districts may consider similar partnerships.

Given the general high acceptance of flu vaccinations within the West Ada school district, vaccinated teachers and staff would be essential to help shape and overcome misinformation and vaccine hesitancy among other teachers and staff. Many resources are available, one of which is the CDC website that contains up-to-date information in regard to vaccinations.[13] These valuable resources could provide additional guidance for school vaccinations and could be used to make sure the correct information is disseminated throughout the school district.

Limitations

As a cross-sectional study, this work had limitations. Participation in the survey was optional so there may be volunteer bias with survey respondents being more likely to receive a flu vaccination or having more favorable views on vaccination in general. Related, we did not directly administer our survey to respondents, but it was distributed through the district's Health Services Supervisor so there may have been other social pressures to be vaccinated. This work also represents a single school district so the results may not be generalizable to other populations. Lastly, because the vaccination landscape continues to be very dynamic, some views expressed in our data may have changed since the survey was completed in 2020.

CONCLUSIONS

The majority of surveyed K-12 teachers/staff received an influenza vaccine during the 2019-2020 season. Unfortunately, a relatively small number of teachers/staff are still vaccine hesitant due to misinformation regarding vaccinations.

HUMAN SUBJECTS APPROVAL STATEMENT

This work was reviewed by Idaho State University's Human Subjects Committee and granted expedited approval.

FUNDING

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CONFLICT OF INTEREST DISCLOSURE STATEMENT

All authors have nothing to disclose.

DISCLAIMER

The statements, opinions, and data contained in all publications are those of the authors.

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Table 1. Participant Demographics

Demographics	Received flu vaccine (N=409)	Did not receive flu vaccine (N=94)	Total (N=503)	P-Value
	Number (%)			
Age (years)				0.0006
20 - 30	35 (8.6)	12 (12.8)	47 (9.3)	
31-40	101 (24.7)	17 (18.1)	118 (23.5)	
41-50	131 (32.0)	48 (51.1)	179 (35.6)	
>51	142 (34.7)	17 (18.1)	159 (31.6)	
National Identity (select all)[1]				0.4781[2]
American Indian or Alaska Native	1 (0.2)	1 (1.1)	2 (0.4)	
Asian	6 (1.5)	0 (0.0)	6 (1.2)	
Black or African American	1 (0.2)	0 (0.0)	1 (0.2)	
Hispanic or Latino	7 (1.7)	1 (1.1)	8 (1.6)	
Native Hawaiian or other Pacific Islander	0 (0.0)	0 (0.0)	0 (0.0)	
White	395 (96.6)	93 (98.9)	488 (97.0)	
Prefer not to answer	9 (2.2)	1 (1.1)	10 (2.0)	
Gender Identity				0.0017
Woman	368 (90.0)	72 (76.6)	440 (87.5)	
Man	40 (9.8)	21 (22.3)	61 (12.1)	
Non-binary or other	0 (0.0)	0 (0.0)	0 (0.0)	
Prefer not to answer	1 (0.2)	1 (1.1)	2 (0.4)	
Highest degree of education				0.1767
Highschool	0 (0.0)	0 (0.0)	0 (0.0)	
Some college - no degree	0 (0.0)	0 (0.0)	0 (0.0)	
Associate's degree	1 (0.2)	0 (0.0)	1 (0.2)	
Bachelor's degree	197 (48.2)	57 (60.6)	254 (50.5)	
Master's degree	204 (49.9)	36 (38.3)	240 (47/7)	
Doctorate degree	7 (1.7)	1 (1.1)	8 (1.6)	
Grades taught (select all)[3]				0.7569[4]
K	77 (18.8)	20 (21.3)	97 (19.3)	
1	93 (22.7)	24 (25.5)	117 (23.3)	
2	84 (20.5)	18 (19.1)	102 (20.3)	
3	83 (20.3)	19 (20.2)	102 (20.3)	
4	85 (20.8)	18 (19.1)	103 (20.5)	
5	83 (20.3)	20 (21.3)	103 (20.5)	
6	86 (21.0)	16 (17.0)	102 (20.3)	
7	93 (22.7)	20 (21.3)	113 (22.5)	
8	88 (21.5)	18 (19.1)	106 (21.1)	
9	60 (14.7)	11 (11.7)	71 (14.1)	
10	69 (16.9)	13 (13.8)	82 (16.3)	
11	65 (15.9)	13 (13.8)	78 (15.5)	
12	69 (16.9)	16 (17.0)	85 (16.9)	

[1] This item allowed multiple answers

[2] P-value was derived when comparing White vs. Mixed-White Vs. Non-White

[3] This item allowed for multiple answers

[4] P-value was derived when comparing Elementary (K-5) vs. Middle School (6-8) vs. High School (9-12) vs. Mixed Schools (K-12)

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Figure 1. Participants Responses to the Survey Question, "Why do you get the flu vaccine? (Select ALL that apply)"

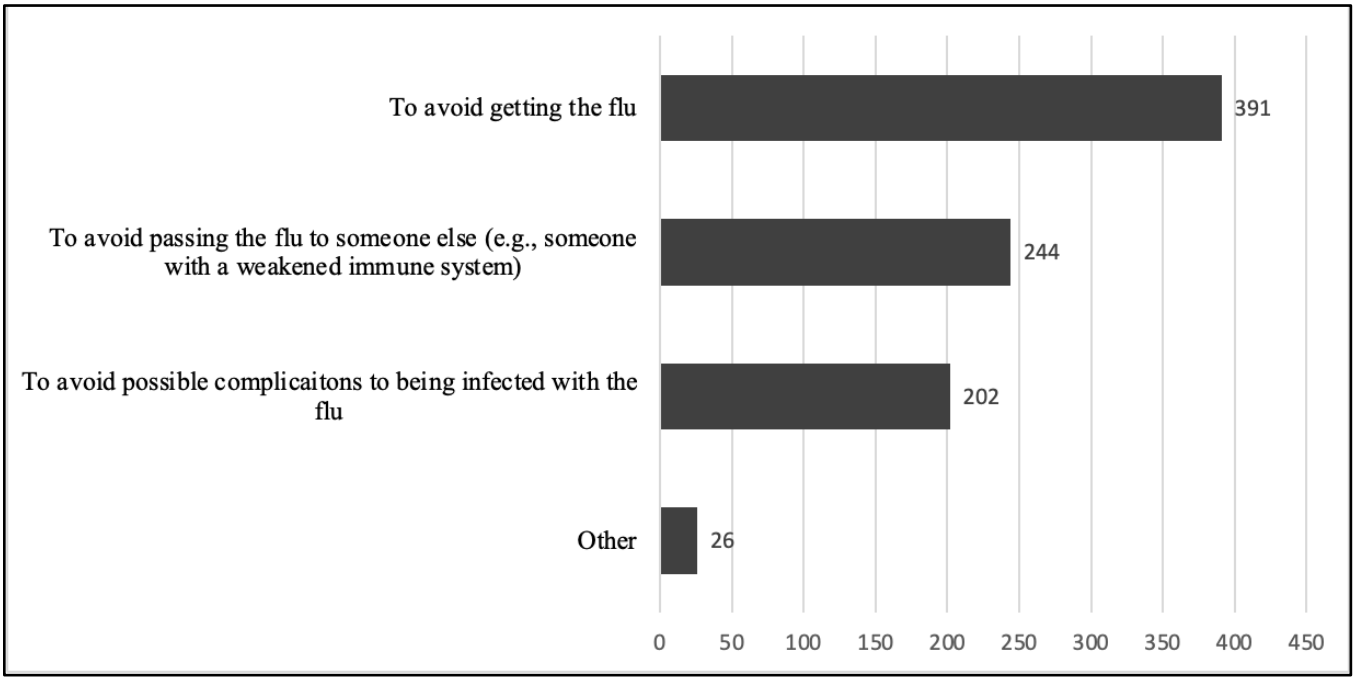

Figure 2. Participants Responses to the Survey Question, "Why do you not get the flu vaccine? (Select ALL that apply)"

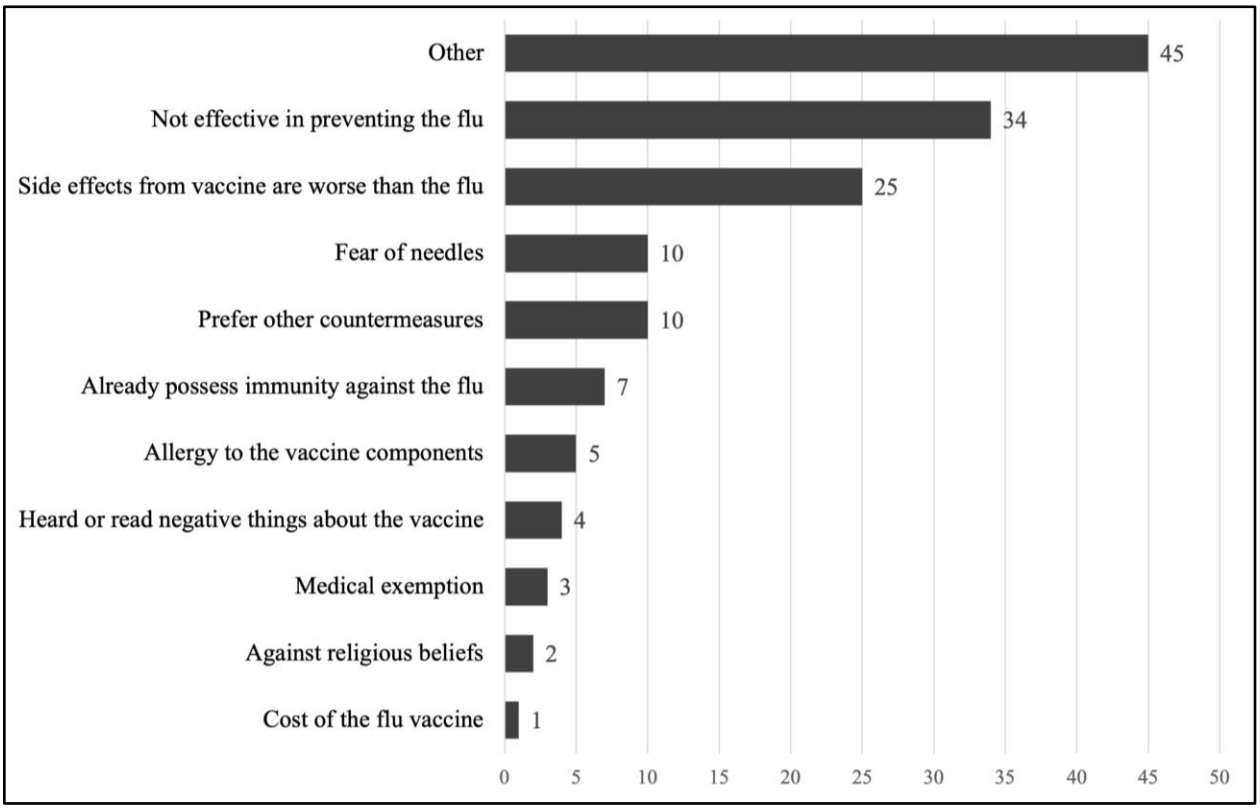

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Table 2. Assessing Participant Knowledge of General Vaccine Information

Statement	Receival of Flu Vaccine (Yes/No)	Strongly agree	Somewhat agree	Neither agree or disagree	Somewhat disagree	Strongly disagree	P-Value
		Number (%)					
The flu vaccine can prevent hospitalizations in patients with diabetes, heart, or lung diseases	**Yes**	162 (39.6)	117 (28.6)	100 (24.4)	9 (2.2)	21 (5.1)	0.0001
	No	19 (20.2)	26 (27.7)	35 (37.2)	8 (8.5)	6 (6.4)	
Yearly flu vaccines are necessary for prevention of the flu[5]	**Yes**	206 (50.4)	125 (30.6)	32 (7.8)	21 (5.1)	24 (5.9)	0.0001
	No	7 (7.4)	20 (21.3)	24 (25.5)	17 (18.1)	26 (27.7)	
The flu vaccine can cause the flu	**Yes**	4 (1.0)	27 (6.6)	51 (12.5)	97 (23.7)	230 (56.2)	0.0001
	No	10 (10.6)	22 (23.4)	29 (30.8)	13 (13.8)	20 (21.3)	
The flu vaccine can cause people to have other diseases or disorders[6]	**Yes**	4 (1.0)	13 (3.2)	46 (11.2)	65 (15.9)	280 (68.5)	0.0001
	No	7 (4.4)	16 (17.0)	16 (17.0)	17 (18.1)	38 (40.4)	
Healthy adults are NOT recommended to get vaccinated for the flu[6]	**Yes**	6 (1.5)	5 (1.2)	7 (1.7)	46 (11.2)	344 (84.4)	0.0001
	No	4 (4.3)	4 (4.3)	31 (33.0)	23 (24.5)	32 (34.0)	
Improved hygiene and/or sanitation are adequate to prevent the spread of the flu[6]	**Yes**	67 (16.4)	91 (22.2)	48 (11.7)	120 (29.3)	82 (20.0)	0.0001
	No	21 (22.3)	49 (52.1)	5 (5.3)	16 (17.0)	3 (3.2)	
I believe it is likely that I will come into contact with the virus that causes the flu[6]	**Yes**	308 (75.3)	80 (19.6)	5 (1.2)	4 (1.0)	11 (2.7)	0.0001
	No	52 (55.3)	35 (37.2)	2 (2.1)	2 (2.1)	3 (3.2)	

[5] NR=1

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