

## RESEARCH ARTICLE

# Influenza Vaccination Coverage Among School Employees: Assessing Knowledge, Attitudes, and Behaviors

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**ABSTRACT**

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**BACKGROUND:** Influenza can spread among students, teachers, and staff in school settings. Vaccination is the most effective method to prevent influenza. We determined 2012-2013 influenza vaccination coverage among school employees, assessed knowledge and attitudes regarding the vaccine, and determined factors associated with vaccine receipt.

**METHODS:** We surveyed 412 (49%) of 841 employees at 1 suburban Ohio school district in March 2013. The Web-based survey assessed personal and work characteristics, vaccine receipt, and knowledge and attitudes regarding the vaccine.

**RESULTS:** Overall, 238 (58%) respondents reported getting the 2012-2013 influenza vaccine. The most common reason for getting the vaccine was to protect oneself or one's family (87%). Beliefs that the vaccine was not needed (32%) or that it was not effective (21%) were the most common reasons for not getting it. Factors independently associated with vaccine receipt were having positive attitudes toward the vaccine, feeling external pressure to get it, and feeling personal control over whether to get it.

**CONCLUSIONS:** Influenza vaccine coverage among school employees should be improved. Messages encouraging school employees to get the vaccine should address misconceptions about the vaccine. Employers should use methods to maximize employee vaccination as part of a comprehensive influenza prevention program.

**Keywords:** influenza; occupational health; vaccination; vaccine.

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Each year in the United States, more than 200,000 people are hospitalized for influenza-related illnesses.<sup>1</sup> The Centers for Disease Control and Prevention (CDC) estimates that from 1976 to 2007, influenza-associated deaths ranged from a low of about 3000 to a high of about 49,000 people per year in the United States.<sup>2</sup> Influenza has been estimated to cause more than 70 million lost working days and \$6.2 billion in lost productivity in the United States every year.<sup>3,4</sup>

Vaccination is the most effective method to prevent influenza and to prevent serious illness and death from influenza infection.<sup>5,6</sup> Since 2010, the Advisory

Committee on Immunization Practices (ACIP) has recommended annual influenza vaccination for all persons aged  $\geq 6$  months in the United States.<sup>7,8</sup>

Over 7.3 million people in the United States are employed in and over 62 million students are enrolled in approximately 130,000 public and private schools.<sup>9</sup> Schools have the potential to become centers of influenza outbreaks because of their large population, high levels of close social contact, and interaction with the community.<sup>10</sup> School settings place teachers, administrators, other school employees, and students at risk for influenza infection and subsequent transmission to others outside the school environment.

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Vaccinating these groups could help protect one fifth of the country's population from influenza.<sup>11</sup>

In January 2013, the National Institute for Occupational Safety and Health (NIOSH) at the CDC received a health hazard evaluation request from a suburban school district in Ohio. The district requested assistance in determining 2012-2013 influenza vaccination coverage among employees in the school district, assessing employees' knowledge and attitudes toward vaccination, and determining factors associated with acceptance and refusal of the vaccine.

## METHODS

### Participants

The school district is a comprehensive preschool through 12th grade school district in the suburbs of a large city in Ohio. The district has 5 elementary schools, 1 middle school, and 2 high schools and serves nearly 7800 students. The study population for this evaluation consisted of all 841 paid full-time and part-time employees, including educational, administrative, and operational staff.

For the 2012-2013 influenza season, the influenza vaccine was offered by the school district in injection form to all employees. The vaccine was provided 1 afternoon in October 2012 at the central district office. Employees covered under the school district's health insurance plan obtained the vaccine free of charge. Employees not covered under this plan obtained the vaccine for \$25.99. The district's insurance plan also covered influenza vaccination at physicians' offices and many of the major retail pharmacy chains in the area.

### Instrument

Using a cross-sectional study design, we invited all employees in the school district to complete a Web-based survey. We used the survey tool in the EpiInfo™ 7 Publish Form to Web Service (Epi Info™, Atlanta, GA). The survey was available over a 3-week period from March 5-26, 2013. The survey link was sent to all school district employees at their work e-mail address by the district's director of human resources with multiple reminders given over the 3 weeks.

The anonymous survey covered personal and work characteristics, pertinent medical history, and receipt of the 2012-2013 influenza vaccine. Demographic questions from the Behavioral Risk Factor Surveillance System Survey Questionnaire<sup>12</sup> and influenza vaccine practices questions adapted from the National 2009 H1N1 Flu Survey Questionnaire were included.<sup>13</sup>

We used the Theory of Planned Behavior, a widely accepted theory for predicting social and health behavior, in developing the survey.<sup>14,15</sup> The Theory of Planned Behavior states that a person's attitude (positive or negative feelings toward a behavior), perception

of subjective norms (the perception that there is social pressure to perform or not perform the behavior), and perceived behavioral control (the perception of choice and availability of resources necessary to perform or not perform the behavior) influence a person's intention to perform the behavior.<sup>16</sup>

We designed questions drawing from the 3 domains of the Theory of Planned Behavior to assess knowledge about and attitudes toward the vaccine.<sup>16</sup> Knowledge and attitudes questions were examined by extent of agreement with statements about the vaccine, using a 4-point Likert scale (ie, disagree, somewhat disagree, somewhat agree, and agree). Additional attitudes questions were examined using a 4-point scale with bipolar adjectives (eg, very good, somewhat good, somewhat bad, very bad).

### Data Analysis

Survey results were analyzed by using descriptive statistical methods such as frequencies, proportions, means, and standard deviations, as appropriate. Responses that used a Likert scale were categorized as "expressed agreement" if respondents marked "agree" or "somewhat agree," and as "expressed disagreement" if respondents marked "disagree" or "somewhat disagree." Internal consistency for the attitudes, subjective norms, and perceived behavioral control variables was analyzed using Cronbach's coefficient ( $\alpha$ ) after adjusting for the directionality of items, when necessary. We created composite scores for variables within the attitudes, subjective norms, and perceived behavioral control domains where  $\alpha > 0.6$  by calculating the mean of the individual scores for each respondent.

Characteristics of school employees who reported receipt of the influenza vaccine were compared to those who denied receipt of the vaccine. Responses to the knowledge and attitudes questions were compared among each group. Bivariate analyses used the Student's t-test, chi-square test, or Fisher's exact test. We used logistic regression for the bivariate analyses of the composite scores for the attitudes, subjective norms, and perceived behavioral control domains. All tests were 2-tailed, and statistical significance was set at  $p < .05$ . We then used a multiple logistic regression model to identify factors independently associated with receipt of the vaccine. All analyses were conducted using CDC EpiInfo 7.1.1.0 with the exception of calculation of the Cronbach's  $\alpha$ , which used SPSS version 18.0 (SPSS Inc., Chicago, IL).

## RESULTS

### Characteristics of Survey Respondents

A total of 412 (49%) of 841 employees completed a survey. The median age of the respondents was

46 years, with a range of 22-71 years. Most (82%) of respondents were women. The median number of years worked in any school district was 15 years, with a range of 0-44 years. The median number of years worked in the current school district was 7 years, with a range of 0-41 years. Table 1 shows the demographic and work characteristics of survey respondents.

Of 394 respondents, 345 (88%) denied having medical conditions placing them at higher risk for influenza complications. Others reported asthma (5%), another lung disease (1%), diabetes mellitus (3%), heart disease (2%), and a weakened immune system caused by active cancer, a chronic illness, or by medicines taken for a chronic illness (4%).

We used self-reported height and weight of participants to calculate their body mass index. Of 386 respondents, 73 (19%) were classified as obese, which was defined as a body mass index  $\geq 30$ . Regarding current mental health conditions, 28 (7%) reported having depression and 41 (10%) reported having anxiety. In total, 342 (86%) of 398 respondents indicated that they did not have either condition.

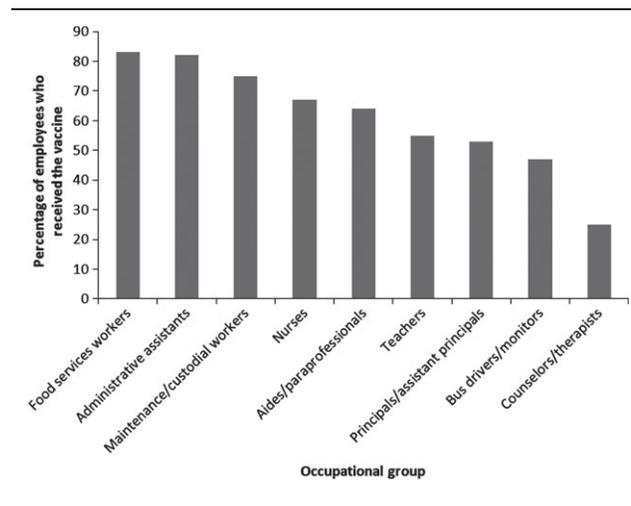
**Table 1. Demographic and Work Characteristics of Survey Respondents**

Characteristic	No. (%) Respondents N = 399-412*
Demographic characteristic	
Female	337 (82)
Pregnant at the time of survey completion	7 (2)
White race	406 (99)
Hispanic ethnicity	2 (0.5)
Highest year of school completed	
Some college or technical school or less	78 (19)
College graduate or more	330 (81)
Annual household income	
<\$35,000	16 (4)
$\geq$ \$35,000	383 (96)
Work characteristics	
Full-time employment	378 (92)
Primary occupation	
Teacher/substitute teacher	250 (61)
Aide/paraprofessional	59 (14)
Administrative assistant	27 (7)
Principal/assistant principal	15 (4)
Bus driver/monitor	14 (3)
Counselor/therapist	12 (3)
Maintenance/custodial worker	8 (2)
Food services worker	6 (1)
Nurse	3 (1)
Other†	18 (4)
Primary workplace	
Elementary school	186 (45)
High school	125 (30)
Middle school	59 (14)
Central district office	21 (5)
Transportation department	17 (4)
Maintenance building	4 (1)

\*Sample sizes ranged from 399 to 412 because of missing values.

†Other primary occupations included administrator, health aide, librarian, and psychologist.

**Figure 1. Vaccination Coverage by Occupational Group**



### Influenza Vaccine Receipt

A total of 238 (58%) of 410 respondents reported getting the 2012-2013 influenza vaccine. A total of 245 (60%) of 411 respondents reported getting the 2011-2012 influenza vaccine the previous season; 212 (89%) of the 238 respondents getting the 2012-2013 influenza vaccine also reported getting the 2011-2012 vaccine. Of the respondents who received the 2012-2013 influenza vaccine, 68% received it by November 30, 2012. The most common place where respondents received the influenza vaccine was the school central district office (58%). Respondents also reported receiving the vaccine at a doctor's office (15%), a pharmacy or drug store (15%), and other locations such as a hospital, other clinic, supermarket, or other nonmedical place (12%).

Vaccination coverage for the 2 largest occupational groups was 55% for teachers and 64% for aides/paraprofessionals. Vaccination rates for the other occupational groups ranged from 25% to 83% and are shown in Figure 1. In addition, 60% of respondents who reported an underlying high-risk medical condition and 59% of respondents classified as obese reported having received the influenza vaccine.

Of the 238 respondents who reported receiving the influenza vaccine, the most common main reason for receiving it was to protect oneself or one's family (87%). Other reasons are shown in Table 2. Of the 172 respondents who had not received the influenza vaccine, the most common reason cited for not receiving it was "I don't think I need the vaccine" (32%). Other reasons are shown in Table 3.

### Influenza Vaccine Knowledge, Attitudes, and Beliefs

Most respondents had positive attitudes toward the vaccine, as most believed the vaccine to be "beneficial" (91%), "good" (92%), and "wise" (92%) versus

**Table 2. Main Reasons Cited by Respondents Who Received the Flu Vaccine**

Main Reason Cited*	No. (%) Respondents, N = 238
To protect myself/my family	206 (87)
I've read or heard that getting the flu vaccine is recommended	11 (5)
My doctor recommended that I get the flu vaccine	9 (4)
Other	12 (5)

\*Respondents were asked to choose 1 main reason.

**Table 3. Main Reasons Cited by Respondents for Not Receiving the Flu Vaccine**

Main Reason Cited*	No. (%) Respondents, N = 172
I don't think I need the vaccine	55 (32)
I don't think the flu vaccine will keep me from getting the flu	36 (21)
I haven't had time to get the flu vaccine	29 (17)
I don't think the flu vaccine is safe	18 (11)
Other†	34 (20)

\*Respondents were asked to choose 1 main reason.

†The most common "other" reasons cited included "I never get the flu" and "I got very sick from a previous flu vaccine."

"harmful," "bad," and "unwise." The 3 attitude items had a Cronbach's (or internal consistency) coefficient of  $\alpha = 0.83$ . Thus, for subsequent analyses, we created an attitudes composite score by calculating the mean of the scores for the 3 items, with higher scores indicating positive attitudes.

Respondents' beliefs about the influenza vaccine are shown in Table 4. Respondents' agreement with subjective norm and perceived behavioral control statements about the vaccine is also shown in Table 3. These 7 subjective norms items (Table 4) had a Cronbach's coefficient of  $\alpha = 0.72$ . Thus, for subsequent analyses, we created 1 subjective norms composite score by calculating the mean of the scores for the 7 items, with higher scores indicating a greater perception of social pressure to get the vaccine. The latter 3 perceived behavioral control items (Table 4) had a Cronbach's coefficient of  $\alpha = 0.64$ . Thus, for subsequent analyses, we created 1 perceived behavioral control composite score for each vaccine by calculating the mean of the scores for the 3 items, with higher scores indicating a greater sense of perceived control.

#### Factors Associated With Influenza Vaccine Receipt

We found no statistically significant associations between sex, race, ethnicity, highest education level, or annual household income and reporting receipt of the 2012-2013 influenza vaccine. However, respondents aged  $\geq 50$  years were more likely to have received the influenza vaccine than those aged  $< 50$  years (68% versus 51%,  $p = .001$ ). Pregnancy,

**Table 4. Respondents' Agreement With Belief, Subjective Norms, and Perceived Behavioral Control Statements About the Influenza Vaccine†**

Statement	No. (%) Respondents Who Expressed Agreement With Statement Regarding Influenza, N = 405-412*
<b>Belief statement</b>	
Teachers/staff and children can spread flu among each other	409 (99)
The flu is a serious infection	392 (96)
The flu vaccine will prevent me from getting the flu	296 (72)
The flu vaccine could make me sick	243 (59)
<b>Subjective norm statement</b>	
My doctor recommended that I get the flu vaccine	276 (67)
A majority of my coworkers have gotten or plan to get the vaccine	227 (55)†
My manager/employer wanted me to get the flu vaccine	223 (54)
My family/friends wanted me to get the flu vaccine	221 (55)
People who are important to me wanted me to get the flu vaccine	216 (52)
It was my duty to get the flu vaccine for my job	149 (36)
I felt social pressure to get the flu vaccine	67 (17)
<b>Perceived behavioral control statement</b>	
It was my decision whether or not to get the flu vaccine	406 (99)
I did not have time to get the flu vaccine	67 (16)
I did not have the money to get the flu vaccine	18 (4)
Getting the flu vaccine required a lot of effort on my part	47 (11)

\*Sample sizes varied because of missing values.

†For this statement, respondents could also answer "I don't know," and 150 respondents chose this option.

obesity, and having an underlying high-risk medical condition, anxiety, or depression were not significantly associated with receipt of the vaccine.

The mean number of years worked in the school district or in any school district was not significantly associated with receipt of the vaccine. Also, occupation and full-time status were not significantly associated with receipt of the vaccine. However, respondents with a primary workplace at the central district office, where the vaccine was administered, were more likely to have received the influenza vaccine than those who worked at other locations (81% versus 57%,  $p = .04$ ).

Respondents who reported receiving the 2011-2012 influenza vaccine were more likely to have received the 2012-2013 influenza vaccine compared to those who did not (87% versus 16%,  $p < .001$ ). Respondents who believed in the efficacy of the influenza vaccine were more likely to have received the vaccine than those who did not believe in its efficacy (69% versus 29%,  $p < .001$ ). Respondents who believed that the

vaccine could make them sick were less likely to have received the vaccine than those who did not (45% versus 77%,  $p < .001$ ). Expressing agreement with the other belief statements in Table 4 was not significantly associated with receipt of the influenza vaccine.

Respondents with a higher (ie, more positive) attitudes composite score for the influenza vaccine were more likely to have received the vaccine ( $p < .001$ ). Respondents with a higher subjective norms composite score for the influenza vaccine, or those who felt greater external pressure from others to get the vaccine, were times more likely to have received the vaccine ( $p < .001$ ). In addition, respondents with a higher perceived behavioral control composite score for the influenza vaccine, or those who felt greater personal control over whether or not to get the vaccine, were more likely to have received the vaccine ( $p < .001$ ).

Variables with  $p < .05$  that were associated with receipt of the 2012-2013 influenza vaccine (except for receipt of the 2011-2012 influenza vaccine) were entered into a multiple logistic regression model to determine which ones were independently associated with receipt of the vaccine. Factors independently associated with receipt of the 2012-2013 influenza vaccine included having positive attitudes toward the vaccine ( $p < .001$ ), feeling external pressure to get it ( $p < .001$ ), and feeling personal control over whether or not to get it ( $p < .001$ ). Believing that the vaccine could make them sick was independently associated with not receiving the vaccine ( $p = .03$ ).

## DISCUSSION

Fifty-eight percent of responding school district employees reported receiving the 2012-2013 influenza vaccine, despite the ACIP recommendation for annual influenza vaccination for all persons aged  $\geq 6$  months in the United States.<sup>8</sup> This vaccination coverage is similar to the 2 published studies we found on school employees. In the first, Gargano et al<sup>10</sup> found that 62% of 66 surveyed school employees received the 2009-2010 seasonal influenza vaccine in 2 rural counties in Georgia. In the second, Ha et al<sup>17</sup> found that 64% of 58 school administrative employees received the 2009-2010 seasonal influenza vaccine in an urban California school district.

Influenza vaccination coverage among the 49% of responding school employees in our survey is higher (58%) than that of the national estimates for the general US adult population (42%) for the 2012-2013 influenza season.<sup>18</sup> It is also more than double the coverage seen in a population of child care workers (25%) for the 2009-2010 influenza season seen in the same county.<sup>19</sup> In contrast, our findings are lower than the 2011-2012 influenza season coverage seen among US healthcare personnel (67%). This difference is not surprising because healthcare

personnel are considered a high risk occupational group, and many efforts have focused on increasing vaccination coverage in this group.<sup>7</sup>

We found that 3 major barriers to getting the vaccine are that some school district employees did not believe they needed the vaccine, some did not think that the vaccine is effective, and some believed the vaccine would make them sick. These findings are similar to results from the study of school administration employees,<sup>17</sup> and multiple studies of healthcare personnel and seasonal and pandemic influenza vaccination.<sup>7,20</sup> These reasons are also similar to those most commonly cited by respondents of a community study examining intent to receive the 2009 pandemic influenza A (H1N1) vaccine.<sup>21</sup> Thus, these barriers are not exclusive to school employees and are consistently present in healthcare personnel and the general population. This highlights a critical obstacle that public health officials and employers must overcome to increase influenza vaccination rates.

Another common main reason cited for not getting the influenza vaccine was "I haven't had time to get the flu vaccine." Our results show that the central district office was the most common place where respondents were vaccinated and that employees working out of the central district office were more likely to have received the influenza vaccine than those working in other locations. This suggests that providing vaccination at each of the schools may improve vaccination rates. In the United States during the 2010-2011 influenza vaccination season, the workplace was the second most common vaccination location outside a doctor's office.<sup>22</sup> Annual influenza vaccination in the workplace has also been shown to reduce absenteeism and provide cost savings to employers.<sup>23-26</sup>

We found that respondents who reported receiving the 2012-2013 influenza vaccine were more likely to have received the 2011-2012 influenza vaccine. Previous seasonal influenza vaccination has also been a commonly cited predictor of subsequent pandemic and seasonal influenza vaccination in studies of healthcare workers and the general adult population.<sup>20,27,28</sup> Therefore, changing an employee's negative beliefs about and attitudes toward the influenza vaccine and improving ease of access to vaccination has the potential to convert that employee to a yearly "adopter." Future vaccination campaigns should emphasize the necessity of yearly influenza vaccination.

Factors independently associated with receipt of the influenza vaccine included having beliefs that it is effective and safe, having positive attitudes toward the vaccine, feeling external pressure to get vaccinated, and feeling personal control over whether or not to get the vaccine. These findings suggest that employees' attitudes and beliefs about the influenza vaccine were more predictive of receipt of the vaccine than demographic and work characteristics and underlying

medical conditions. These findings are similar to those of Gargano et al<sup>10</sup> determined that H1N1 vaccine receipt was associated with perceived barriers and social norms. Because perceiving social pressure to get the vaccine was associated with receipt of the vaccine, physicians, employers, labor organizations, and school boards should improve efforts to recommend influenza vaccination for school employees.

Being classified as obese or reporting an underlying medical condition associated with high risk of serious influenza-related complications was not significantly associated with receipt of the vaccine. Though the percentage of respondents who reported these conditions was low, this finding suggests that public health messages promoting the importance of vaccination in these high-risk groups may have been ineffective in reaching the intended audiences, and that efforts to improve coverage should be strengthened.

### Limitations

Our evaluation was subject to some limitations. First, respondents self-reported their receipt of the vaccine, and this may have been subject to recall errors. Vaccination was not validated by medical records. Second, our evaluation focused on employees of 1 suburban school district in Ohio, and our results may not be generalizable to employees in districts in urban and rural settings and in districts with more racial diversity. Third, our participation rate was 49%, despite multiple e-mail reminders from employer and teachers' association representatives. We believe several factors may have contributed to this response rate. Because of initial technical difficulties, the Web survey was inaccessible over periods of time. Also, we did not have direct contact with all employees but relied on employer and teachers' association representatives to disseminate the survey for us. This response rate raises the possibility that our results are not representative of all district employees, especially the operational employees, whose response rates (12-22%) were lower than those of the educational employees (55-61%). The response rate to our survey is higher than those seen in other electronic surveys (mean response rates between 19 and 40%), and lower rates are seen in larger surveys, workplace surveys, and surveys not offering incentives.<sup>29-34</sup> Nevertheless, it is possible that our survey was subject to selection bias, and that we may have overestimated or underestimated the influenza vaccination rate among district employees.

### Conclusions

Influenza vaccination coverage among the responding school district employees was 58%. Beliefs that the vaccine was not effective or was not needed and the perception of not having enough time to get it

were the most common reasons cited for not getting it. Factors independently associated with vaccine receipt were having positive attitudes toward the vaccine, feeling external pressure to get vaccinated, and feeling personal control over whether or not to get the vaccine. Our findings highlight the need to emphasize the benefits, safety, and effectiveness of vaccination and to make the vaccine more available at the workplace.

### IMPLICATIONS FOR SCHOOL HEALTH

A comprehensive strategy to prevent the spread of influenza in the school district should include all of the following: vaccination of students, faculty, and staff; hand hygiene; cough etiquette; observing students for symptoms of respiratory illness; and encouraging sick students and employees to stay home. Vaccination is a pivotal part of this comprehensive strategy and is the most effective method to prevent serious illness and death from influenza infection.<sup>5,6</sup> Vaccination has been shown to reduce illness and absenteeism caused by influenza. School employees should receive influenza vaccination to protect themselves, their families, and their students from influenza. Annual influenza vaccination is recommended for all persons aged  $\geq 6$  months who do not have contraindications to vaccination.<sup>8</sup>

We recommend that school districts and associated labor unions encourage employees to get the influenza vaccination by including messages in e-mails, posters throughout work locations, staff newsletters, and staff meetings. Messages should encourage and highlight motivators for employees such as protecting themselves, family members, and the students with whom they interact. Messages can also address the most frequent anti-vaccination ideas, including the perceived low risk for infection, perceived lack of vaccine efficacy, and lack of knowledge of vaccine safety. School districts should also emphasize the importance of influenza vaccination among pregnant women and individuals with high-risk medical conditions in health messages. These groups are at highest risk for developing influenza-related complications.

School districts should explore the feasibility of offering on-site annual influenza vaccination to employees at no or low cost. Schools can also identify an employee or employees who can advocate getting the influenza vaccine to coworkers. This approach has been shown to be effective in increasing influenza vaccination rates among healthcare personnel.<sup>35</sup>

A full discussion of comprehensive recommendations for influenza prevention can be found in CDC's Guidance for School Administrators to Help Reduce the Spread of Seasonal Influenza in K-12 Schools at <http://www.cdc.gov/flu/school/guidance.htm>.

## Human Subjects Approval Statement

As a public health response, per the guidelines of United States Title 45 Code of Federal Regulations Part 46, this evaluation was determined to not require review by an institutional review board.

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