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Motivators for the public to receive the seasonal influenza vaccination and the effect of coronavirus disease 2019 pandemic on the uptake of the seasonal influenza vaccination

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Abstract:

BACKGROUND: The coverage of the seasonal influenza vaccine has always been sub-par. Understanding the motivators of receiving vaccines, especially during pandemics, could enhance and increase the coverage rates. The Saudi Ministry of Health launched its annual influenza vaccination campaign during the 2021 influenza season and provided vaccinations in primary healthcare settings. This study aims to explore public motivators to receive influenza vaccination, particularly during the coronavirus disease 2019 global pandemic.

MATERIALS AND METHODS: This cross-sectional study enrolled 783 participants who attended the influenza vaccination campaign. All persons who received the influenza vaccine in the influenza vaccination campaign held in Dammam, Saudi Arabia, from October to November 2021, were interviewed and completed a self-administered questionnaire. Odds ratio with a 95% confidence interval were estimated using the full model fit . The significance level was set as $\alpha = 0.05$.

RESULTS: The majority of the participants had more than high school education (81%), were males (66.2%), and married (59.6%), and 50.6% were below 35 years of age. Participants with higher education, health-care workers, and those who had been previously counseled on influenza vaccination were less likely to have started taking the influenza vaccination, whereas smokers and persons who do not have routine checkups were more likely to start influenza vaccination. The main motivator to take the influenza vaccine was the establishment of a vaccination campaign near the participant's workplace (62.2%), followed by advice from their physician (30.3%), and fear of having influenza disease (29.6%).

CONCLUSION: Accessibility to the vaccination campaigns was the main motivator for receiving the vaccine followed by the advice from physician. Advice from physician and increasing mobile vaccination campaigns and mobile clinics would substantially increase influenza vaccine uptake.

Keywords:

Campaign, coronavirus disease 2019, influenza, motivators, Saudi Arabia, vaccination

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Introduction

Seasonal influenza affects millions of people yearly; most cases are self-limiting and require no medical interventions. However, seasonal influenza results in up to 650,000 deaths yearly.[1] Annual vaccination against seasonal influenza is recommended for the whole population aged 6 months and older.[2] Taking the influenza vaccine can reduce the risk of infection by 40%–60%, and reduce the risk of admission to the intensive care unit (ICU) and pediatric ICU because of influenza-related illnesses by 82% and 74%, respectively.[3] Owing to the effectiveness of the influenza vaccine to reduce the number of cases and the burden on the health-care system, Saudi Arabia offers free annual influenza vaccination to the entire population every year. Nonetheless, the vaccination coverage in Saudi Arabia is at only 15% of the total population according to a study done in 2017.[4] Moreover, a recent study in 2021 showed that only 12.7% of the Saudi population receive the vaccine regularly/yearly.[5] The reason behind these low rates could be multifactorial: fear of the side effects including congenital defects, and the belief that the disease is mild and thus requires no vaccination.[6,7] Interestingly, refusal of the influenza vaccine is not limited to the general population alone. A study published in 2019 showed that 49.2% of nursing students did not intend to receive the influenza vaccine and 19.5% of them were hesitant.[8]

In September 2021, the Saudi Ministry of Health started the influenza vaccination campaign and provided vaccinations in primary health-care centers to encourage the public during the coronavirus disease 2019 (COVID-19) pandemic[9] to take the vaccine. However, many were unsure and refused the vaccination because of widespread misinformation during the pandemic.[10]

Seasonal influenza vaccination just as the acceptance of other vaccinations overall can be affected by factors such as global pandemics, when the public have the fear of side effects and are concerned for their safety.[10] A study done in China, 2010, showed that during the 2009 H1N1 pandemic, Chinese nurses were less likely to receive the seasonal influenza vaccine compared to the previous year. The study showed that in the previous year, 60% of the participants had received the seasonal influenza vaccine. However, during the pandemic, only 37.5% of them intended to receive the vaccine. The main reasons behind their decision were the fear of the side effects, belief that the infection is mild, and doubts of the efficacy of the vaccine.[11] The aim of this study was to describe the factors that motivate people to receive the seasonal influenza vaccine during the COVID-19 pandemic.

Materials and Methods

A cross-sectional design using an interview-based questionnaire was administered by the data collection team to every person who received the influenza vaccine during the influenza vaccination campaign in Dammam, Saudi Arabia, in November 2021. Data were collected in the last week of November 2021, of the campaign launched on five different campuses to increase accessibility. Invitations and flyers with the date and locations of the campaign were sent before the start of the campaign. Ethical approval was obtained from the Institutional Review Board vide Letter No. IRB 2021-01-439 dated 23/11/2021, and written informed consent was taken from all participants in the study and in the case of minors (<18 years old), from their parents as well. Participants were assured of the confidentiality of the data and for its use for research purposes only.

Eleven well-trained medical interns handed interview-based questionnaires to each person who received the influenza vaccine during the campaign. The interview was conducted after the participants had been through the vital station and got the clearance to take the influenza vaccine. The questionnaire was developed by the investigators after reviewing similar questionnaires in other studies[2,12,13] The questionnaire had three sections: the first contained questions on participants' sociodemographic data (including age, gender, marital status, educational level, employment status, smoking status, whether they were health-care workers or not, and if they had received the influenza vaccine before); the second section aimed at the participants' medical health consciousness and had 12 questions based on Centers for Disease Control (CDC) recommendations for vaccination.[2] It focused on participants' health status and current comorbidities (including obesity, diabetes mellitus, hypertension, renal disease, hepatic disease, neurological illnesses, cardiovascular disease, pulmonary diseases, and hematological disorders), as well as whether they had had COVID-19 infection in the past months. The third section measured the factors and motivations that influenced participants to receive the influenza vaccine during the COVID-19 pandemic in the current year.

The questionnaire was revised by three expert faculty members and its clarity was evaluated with a pilot study carried out on 20 volunteers who were then excluded from the study sample. Minor modifications were made to the wording of the questions and layout based on feedback from experts, faculty, and interviewers.

The minimum required sample size was calculated as 384 using Epi Info® version 7.0 with the following input: increase acceptance of the influenza vaccine during the

COVID-19 pandemic by 50% at a confidence level of 95% with a precision of 5.

After checking for completeness and consistency, data were analyzed using IBM SPSS for Windows, version 26 (IBM Corp., Armonk, NY, USA). The categorical variables, presented as percentages and frequency distribution, were compared using the Chi-squared or Fisher's exact tests. Figures were used to summarize the risk profile of participants and the motivators of receiving the influenza vaccine during the pandemic. Multivariable binary logistic regression analysis was done to identify the independent factors associated with starting to receive the influenza vaccine after the pandemic. Candidate variables were selected based on medical literature and bivariate analyses. Odds ratio (OR) with 95% confidence interval (CI) were estimated using the full model fit and were reported in comparison with the designated reference group. The presence of multicollinearity was checked using the bivariate Spearman's correlation coefficients. The goodness-of-fit of the model was evaluated using the Omnibus and Hosmer–Lemeshow tests. The significance level was defined as $\alpha = 0.05$.

Results

The survey was completed by 783 respondents comprising 518 (66.2%) males and 265 (33.8%) females. In total, 368 (47.0%) participants were aged 18–34 years, representing the most frequent age group; 267 (34.1%) and 120 (15.3%) participants were aged 35–49 years and ≥50 years, respectively. Overall, 467 (59.6%) participants were married. Only 149 (19.0%) participants had high school education (10.6%) or less (8.4%), and 181 (23.1%) participants had a Master's or Ph.D. degree. Over one-third (36.8%) of the participants were employees in Imam Abdulrahman Bin Faisal University (IAU) and approximately one-fourth (25.5%) of the participants were students, 172 (22.0%) of whom were IAU students and 16 (2.0%) non-IAU students. While almost half (49.4%) of the participants had had a routine checkup within the past year, one-fourth (25.3%) had never had any checkup. However, 624 (79.7%) participants reported that they had no counseling about taking the influenza vaccine during their routine health visits.

Of the 783 participants who received the influenza vaccine, 311 (39.7%), 282 (36.0%), and 197 (25.2%) reported that they had also received it in 2019, 2018, and 2017, respectively. However, 368 (47.0%) reported that they had not taken it in the 3 years preceding the COVID-19 pandemic [Table 1].

Figure 1 summarizes the risk profile of the participants. Over one-fourth (27.3%) of participants had at least one comorbidity. Diabetes mellitus and obesity were the most frequent comorbidities seen in 67 (8.6%) and 51 (6.5%) participants, respectively. Notably, 50 (6.4%) participants had pulmonary disease, including asthma. Only four (1.5%) pregnant women were in this study. Overall, 51 (6.5%) participants had had COVID-19 and only 1 had required ICU admission.

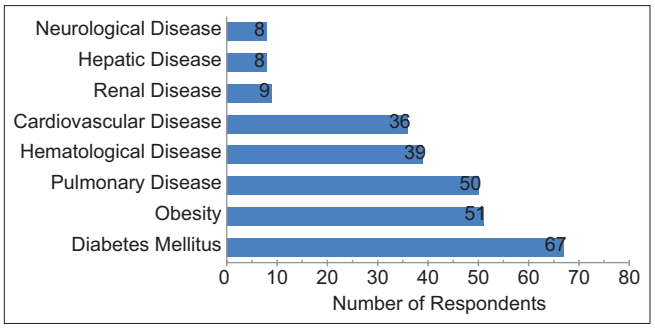

Figure 1: Respondents with comorbidities

Figure 2 summarizes the motivators to receive the influenza vaccine after the pandemic. Overall, the most common motivator (62.2%) was having a vaccination campaign near the workplace of the participant. In addition, 232 (29.6%) reported that they were vaccinated against the influenza virus because of their fear of getting influenza disease. Further, 200 (25.5%) participants were concerned about becoming severely ill and unable to access the necessary medical care because of the overwhelming demand on the health-care system. In total, 237 (30.3%) received the influenza vaccine following professional medical advice. Planning for Umrah (travel to Makkah) and indications of other medical conditions were the reported motivators by 30 (3.8%) and 18 (2.3%) participants, respectively.

Table 2 provides insights into the factors that influenced 783 study participants to take the initial dose of the influenza vaccine following the COVID-19 pandemic. Regarding age, participants aged 35–49 years (OR = 0.75, 95% CI: 0.55–1.02) and those aged 50 years or older (OR = 0.72, 95% CI: 0.48–1.08) exhibited slightly reduced odds of getting vaccinated post-COVID-19 compared to those under 35 years. However, these associations did not reach statistical significance ($P > 0.05$). Gender did not significantly impact vaccine initiation, as evidenced by the OR of 0.80 for females compared to males ($P = 0.15$).

Notably, marital status yielded significant findings. Married individuals had lower odds of vaccine initiation (OR: 0.66, 95% CI: 0.50–0.88) compared to singles. Education level played a significant role, with participants having a diploma or bachelor's degree (OR: 0.45, 95% CI: 0.31–0.66) or higher education (OR: 0.29, 95% CI: 0.19–0.46) showing reduced odds compared to those with a high school education or less. Health-care

Table 1: Sociodemographic characteristics of the study participants who received influenza vaccine during influenza vaccine campaign in Dammam, 2021

Variable	Total (*n*=783) *N* (%)	Started receiving influenza vaccine after COVID-19	
		Yes (*n*=368) *N* (%)	No (*n*=415) *N* (%)
Age (years)			
<35	396 (50.6)	201 (54.6)	195 (47.0)
35–49	267 (34.1)	116 (31.5)	151 (36.4)
≥50	120 (15.3)	51 (13.9)	69 (16.6)
Gender			
Male	518 (66.2)	253 (68.8)	265 (63.9)
Female	265 (33.8)	115 (31.3)	150 (36.1)
Marital status			
Single	316 (40.4)	168 (45.7)	148 (35.7)
Married	467 (59.6)	200 (54.3)	267 (64.3)
Education level			
High school or less	149 (19.0)	97 (26.4)	52 (12.5)
Diploma or bachelor	453 (57.9)	250 (56.3)	246 (59.3)
Higher education	181 (23.1)	11 (17.4)	117 (28.2)
Employment status			
Student	200 (25.5)	107 (29.1)	93 (22.4)
Employed	559 (71.4)	250 (67.9)	309 (74.5)
Nonemployed/retired	24 (3.1)	11 (3.0)	13 (3.1)
Smoking status			
Nonsmoker	642 (82.0)	289 (78.5)	353 (85.1)
Smoker	141 (18.0)	79 (21.5)	62 (14.9)
Healthcare worker			
No	638 (81.5)	319 (86.7)	319 (76.9)
Yes	145 (18.5)	49 (13.3)	96 (23.1)
Last routine checkup			
Within ≤2 years	509 (65.0)	213 (57.9)	296 (71.3)
Within >2 years	76 (9.7)	38 (10.3)	38 (9.2)
Never	198 (25.3)	117 (31.8)	81 (19.5)
Influenza vaccine counseling			
No	624 (79.7)	324 (88.0)	300 (72.3)
Yes	159 (20.3)	44 (12.0)	115 (27.7)

COVID-19=Coronavirus disease 2019

worker status was associated with increased odds of starting vaccination (OR: 0.51, 95% CI: 0.35–0.75).

Final logistic regression model to identify the independent factors associated with receiving the influenza vaccine after the COVID-19 pandemic [Table 3]. The results presented showed persons with higher education levels (adjusted OR [AOR] = 0.38), healthcare workers (AOR = 0.66), and persons counseled about influenza (AOR = 0.38) were less likely to have started receiving influenza vaccine. On the other hand, smokers (AOR = 1.43) and persons who never had routine checkups (AOR 1.61) were more likely to receive influenza vaccine.

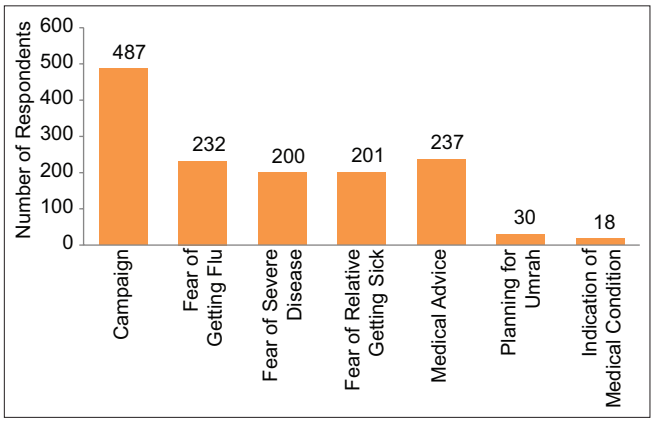

Figure 2: Reported motivators for getting the influenza vaccine

Discussion

Currently, vaccinations of all kinds are being questioned and doubted for multiple reasons, including the fear of their side effects or concerns for their effectiveness.[10] This study has found that almost half of the participants started to receive the influenza vaccine in the middle of the pandemic of COVID-19. The increase in the willingness to receive the vaccine is encouraging,

Table 2: Factors associated with starting getting influenza vaccine after the coronavirus disease 2019 pandemic (*n*=783)

Variable	Univariable analysis		Multivariable analysis	
	Crude OR (95% CI)	*P*-value	Adjusted OR (95% CI)	*P*-value
Age (years)				
<35	Reference group		Reference group	
35–49	0.75 (0.55–1.02)	0.07	1.02 (0.68–1.55)	0.92
≥50	0.72 (0.48–1.08)	0.11	1.06 (0.63–1.79)	0.82
Gender				
Male	Reference group		Reference group	
Female	0.80 (0.60–1.08)	0.15	0.94 (0.67–1.32)	0.72
Marital status				
Single	Reference group		Reference group	
Married	0.66 (0.50–0.88)	0.01	0.87 (0.57–1.31)	0.50
Education level				
High school or less	Reference group		Reference group	
Diploma or bachelor	0.45 (0.31–0.66)	<0.01	0.55 (0.36–0.84)	0.01
Higher education	0.29 (0.19–0.46)	<0.01	0.40 (0.24–0.66)	<0.01
Employment status				
Student	Reference group		Reference group	
Employed	0.70 (0.51–0.97)	0.03	0.82 (0.51–1.32)	0.42
Nonemployed/retired	0.74 (0.31–1.72)	0.48	0.65 (0.23–1.78)	0.40
Smoking status				
Nonsmoker	Reference group		Reference group	
Smoker	1.56 (1.08–2.25)	0.02	1.46 (0.97–2.19)	0.07
Health-care worker				
No	Reference group		Reference group	
Yes	0.51 (0.35–0.75)	<0.01	0.65 (0.43–0.97)	0.03
Last routine checkup				
Within ≤2 year	Reference group		Reference group	
Within >2 years	1.39 (0.86–2.25)	0.18	1.20 (0.73–1.97)	0.48
Never	2.01 (1.44–2.80)	<0.01	1.53 (1.07–2.20)	0.02
Influenza vaccine counseling				
No	Reference group		Reference group	
Yes	0.35 (0.24–0.52)	<0.01	0.39 (0.26–0.58)	<0.01

OR=Odds ratio, CI=Confidence interval

Table 3: Final logistic regression model: Factors associated with starting getting influenza vaccine after the coronavirus disease 2019 pandemic (*n*=783)

Variable	Final logistic regression model		
	OR	95% CI	*P*-value
Education level			
High school or less	Reference group		
Diploma or bachelor	0.57	0.38–0.86	0.01
Higher education	0.38	0.24–0.61	<0.01
Smoker	1.43	0.97–2.11	0.07
Health-care worker	0.66	0.44–0.98	0.04
Last routine checkup			
Within ≤2 years	Reference group		
Within >2 years	1.24	0.76–2.04	0.39
Never	1.61	1.13–2.29	0.01
Received influenza vaccine counseling	0.38	0.26–0.57	<0.01

OR=Odds ratio, CI=Confidence interval

especially when only 39.7% and 25.2% of the participants had received the vaccine in 2019 and 2017, respectively. These findings are at variance with a study done by To *et al*., who explored the acceptance of the seasonal influenza vaccination during the H1N1 pandemic and found that more than half had received the influenza vaccine in the previous year although only 37.5% were willing to be vaccinated in that year.[11] The difference in the attitudes of the participants could be because of the severity of the two pandemics. As per the recent World Health Organization records, the number of confirmed COVID-19-related deaths was around 4.7 million deaths worldwide,[12] but there were only 18,500 H1N1-related deaths confirmed.[14]

Regarding what motivated the participants to take the vaccine this year, the main motivator as reported by more than half the participants was "having a vaccination campaign in the workplace." This is consistent with a study by Haridi *et al*., which found that 42% of the participants who had access to the influenza vaccination in their workplace received it on a regular basis, and only

36.9% of the workers with no access to the vaccine in the workplace received it yearly.[15] These results emphasize the importance of the accessibility to vaccination campaigns of increasing both the compliance and rate of vaccination. Another motivator mentioned by 30.3% of participants was "receiving advice from a health-care worker" which encouraged them to get the influenza vaccine. Interestingly, advice from a health-care worker was found to be the main motivator in two recent studies done by Alqahtani *et al*., and Masoud *et al*.[4,16] Although prevention is an essential part in primary care leading to positive outcomes, 79.7% of our study participants had no counseling on the influenza vaccine during their regular checkups. This is similar to the results obtained by AlMusailhi *et al*., study, which showed that only a third of pregnant women were advised by their physicians to take the influenza vaccine.[7] The stated numbers reflect a default in the primary care practice and the application of counseling on recommended vaccinations.

The "fear of getting severely ill and not having access to proper healthcare because of the COVID-19 restrictions and demand" was the motivation for a quarter of this study's participants to get vaccinated during the pandemic. This fear might have arisen because of the widespread misinformation as well as multiple media and television reports of collapsing health-care systems worldwide.[13,17,18]

In this study, it was found that there was no significant association between having a comorbid condition and starting to receive the influenza vaccine during the pandemic. The refusal to take the influenza vaccine could be explained in a variety of ways, including as reported by multiple studies, not regarding influenza as a serious condition requiring vaccination.[10,16,19,20] A study conducted by Santos *et et al*., showed that the majority (96.7%) of their high-risk participants aged 65 years and above or with chronic conditions consider seasonal influenza a mild disease that cannot lead to serious complications.[21] Another study conducted by Alotaibi *et al*., to assess the awareness of individuals aged 65 years and above on the influenza vaccination, showed that almost half of the participants had never taken the influenza vaccine, and 46% of them believed it unnecessary.[22] The aforementioned studies highlight the need to raise awareness of the public on the importance of vaccination of both the general public and at-risk individuals.

Specific factors were significantly associated with starting to receive the vaccine after the pandemic. For instance, the age of the participants was significantly associated with starting to take the vaccine after the pandemic. Participants aged below 18 years were found to be the least likely to start receiving the influenza vaccine after the pandemic, compared to participants aged between 18 and 34 years old. The reasons for this hesitancy regarding vaccination could be the same as those mentioned by undergraduate students in South California, who believed that the vaccine might induce flu-like symptoms, cause serious side effects, or that they were not at risk of contracting flu.[23] Another study concluded that the lower rate of receiving the influenza vaccine in the postpandemic phase by those aged below 18 years could be because those in that age group did not consider themselves at risk of influenza or were wary of the potential side effects of the vaccine.[5] In addition, educational level and employment status were found to be significantly associated with beginning to receive the influenza vaccine after the pandemic. More than half of college and high school graduates started taking the vaccine after the pandemic. On the other hand, only 35.4% of master's and doctorate degree holders started to receive the vaccine after the pandemic. Similarly, a study done in 2021 that investigated the uptake of influenza vaccine of healthcare workers linked the educational level to the uptake of the vaccine. It found that 61% of bachelor's degree holders received the vaccine during the pandemic compared to 54% of postgraduate participants.[24] The study conducted by Wei *et al*., found more refusal of the vaccine in the more educated communities as well.[25]

In addition, our data showed an increase in the vaccination coverage of healthcare workers, as 33.8% of health-care workers in this study were found to have started receiving the vaccine after the pandemic. However, the CDC indicated a slight decrease of influenza vaccine coverage of health-care workers during the pandemic.[26] Our result might reflect an increased level of awareness regarding the importance of the influenza vaccination in Saudi Arabia, as well as the safety measures taken in the COVID-19 era of social distancing and the wearing of masks; it could also reflect the sense of responsibility toward patients. The limitation of the study is that a large number of the participants belong to IAU (employees and students) which might have caused bias toward educated participants.

Conclusion

In this study, it was found that almost half of the individuals who took the influenza vaccine were taken it for the first time because of the current COVID-19 pandemic. The main motivators for taking the vaccine were that the vaccination campaign was held in their workplace, there was advice from a health-care provider, and the fear of getting a severe illness during the pandemic. Since accessibility to the vaccination campaigns was the main motivation for receiving the

vaccine, it is envisaged that increasing the number of mobile vaccination campaigns or using mobile clinics would substantially increase the uptake of seasonal influenza vaccination.

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Nil.

Conflicts of interest
There are no conflicts of interest.

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