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# Seasonal influenza and its vaccine: Knowledge and attitudes of the general population in Makkah city, Saudi Arabia

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## ABSTRACT

**Background:** Influenza is a significant factor to morbidity and mortality that is underreported. The rate of vaccination uptake is greatly influenced by the public's understanding of influenza. By increasing public knowledge of the illness and the availability of vaccinations, influenza vaccination uptake can be dramatically boosted. **Objectives:** To determine the degree of knowledge of the Saudi community concerning of influenza and its vaccine and their attitude with the underlying intention of identifying the key variables and obstacles that impede its acceptance. **Methods:** A descriptive cross-sectional study involving a social-media distributed web-based questionnaire was performed with 517 participants in Makkah City, Saudi Arabia. **Results:** Of the 517 respondents, 42.2% of the respondents had a good knowledge level based on the knowledge score. According to the regression analysis, working in the medical area (OR=3.45) and intention to go on a pilgrimage in the current year (OR=2.32), were the independent predictors of possessing a high level of knowledge of influenza and the associated vaccine. Avoiding drugs, being worried about the vaccine's negative effects, and believing that seasonal flu is not dangerous enough to merit vaccination were the impediments to getting the vaccine. **Conclusion:** More educational initiatives are required to promote influenza prevention.

**Keywords:** Seasonal influenza, knowledge, attitude, Barriers, Saudi Arabia

## 1. INTRODUCTION

Extremely contagious influenza viruses such as H1N1, H3N2, and coronaviruses are the primary causes of seasonal influenza, a serious respiratory illness, and are associated with a range of symptoms from minor upper respiratory symptoms to severe pneumonia that requires hospitalization and results in mortality (Moghadami, 2017). Influenza severely affects between three and five million individuals worldwide annually and results in between 250,000 and 500,000 deaths (Stohr, 2002). The 2009

influenza A (H1N1) infection pattern in Saudi Arabia was detailed in the epidemiological investigation of 1138 patients. Clinical examinations, laboratory tests, and questionnaires with respondents were used to collect the data. According to the study, 25% of the cases among people aged 15 to 24 tested positive for H1N1 by PCR (Khdayr et al., 2014). The pulmonary consequences of influenza are frequently fatal, especially during pregnancy. For instance, the infection can lead to bronchitis, viral pneumonitis, subsequent bacterial pneumonia and acute respiratory distress syndrome (Moghadami, 2017). Children's consequences include febrile seizures, viral myocarditis, otitis media and meningoenzephalitis (Cate, 1987). The influenza vaccine is an effective preventive measure and the best method for reducing the negative consequences of the illness and its complications (Alicino et al., 2015).

In particular, influenza prophylaxis demands vaccination for anyone older than six months and health authorities (Fiore et al., 2009) suggest getting vaccinated against flu every year unless it is contraindicated. Although the vaccine is available and the severity of the illness is recognized as affecting quality of life and overall health, uptake rates are still low, adding to the disease's escalating burden internationally (Rachiotis et al., 2010). In past studies Jordan (Assaf et al., 2016) and the Gulf area (Alqahtani et al., 2017) were shown to have low immunization rates. The Gulf region has a 17% immunization rate for influenza, with a lack of understanding of the importance of vaccination representing the primary cause of vaccine refusal. The percentage of Jordanians who receive the vaccination varies from 9.9% to 27.5% and the most pervasive misperception is a concern for its side effects. Korani, (2015) investigation into the seasonal flu vaccination status of 200 patients in Makkah, Saudi Arabia found that 18.5% of them had received the shot. However, another study conducted in Saudi Arabia (Haridi et al., 2015) showed a high influenza vaccine uptake (88%) among healthcare providers during the 2014–15 seasons. This level was achieved following the adoption of a mandatory vaccination programme in Saudi Arabia for healthcare personnel.

Visitors from across the world arrive in Makkah city on their yearly journeys for Hajj and Omura. The possibility of respiratory infections spreading among pilgrims, guests and locals increase with such a large crowd of people congregating in Makkah. Free vaccines are available each year from the Saudi health authorities (Ahmad et al., 2021), especially before starting a pilgrimage (Algarni et al., 2015). The importance of yearly seasonal flu vaccinations is also emphasized on the website of the Ministry of Health, on a number of social media sites and by healthcare professionals. According to recent studies, immunization coverage has been rising over time (Alfelali et al., 2018; Alqahtani et al., 2015), with Saudi pilgrims showing flu vaccination rates of 21.4%, 48.2% and 58.1% in 2013, 2014 and 2015, respectively. However, since only Hajj is required in the country, there is a low uptake rate among Saudis.

By increasing the public's knowledge of the illness and the availability of vaccinations, influenza vaccination uptake can be dramatically boosted (Assaf et al., 2016). Although these factors cannot be fully identified or verified in terms of their relative and independent levels of influence, the literature (Abu-Rish et al., 2016) shows that a refusal to receive the vaccination is brought on by a number of circumstances. Additionally, a variety of time-, place-, and vaccine-specific context-dependent reasons affect vaccine hesitancy. For instance, the study by Memish et al., (2012) in Jordan found that only 51.9% of individuals could properly identify the main techniques for preventing influenza. As a result, the Jordanian community does not generally comprehend the significance of the vaccine for preventing disease. The major barrier to vaccination is the concern about side effects, whereas the main motivator for being vaccinated is to limit the virus' propagation and outbreak (Assaf et al., 2016).

In Saudi Arabia, just 18.5% of the survey respondents in one study in Makkah city reported having received a seasonal flu shot in 2015 (Korani, 2015), which raises concerns about the public's knowledge of the illness and its preventive measures. Saudi data are available from research conducted among healthcare providers (Haridi et al., 2015), Saudi Hajj pilgrims (Alfelali et al., 2018), diabetic patients (Alghamdi, 2019; Alhajaji et al., 2019; Mzjaji et al., 2021; Alhussain et al., 2021), people who frequent primary healthcare facilities (Korani, 2015; Alwahat et al., 2019) and shopping malls (Balkhy et al., 2010), which have all determined the causes of the poor uptake rates for the influenza vaccine. This study seeks to ascertain the Saudi population's knowledge of, attitudes toward and understanding of the influenza virus and its vaccination. It also seeks to identify the main determinants of and barriers to receiving the vaccine.

## 2. MATERIALS AND METHODS

### Study design

This descriptive cross-sectional study examines the Saudi population's knowledge of and attitudes toward the influenza virus and its vaccination as well as identifies the main determinants of and barriers to receiving the vaccine. Potential participants were approached by sending them a questionnaire through social media before and during the seasonal influenza vaccination period (August to October 2022). An online self-enrolled survey was created using the Google Forms platform. To take part in the study, participants were asked for their written consent. Respondents were fully informed of the study's background and goals on the first

page of the online questionnaire. They were advised that their information and opinions would be private and confidential and that they would be able to withdraw at any moment without providing a reason. The questionnaire was designed to be completed by Saudi respondents who were at least 18 years old and agreed to take part in the study. This research was carried out in Makkah, the holiest city for Muslims worldwide. It is the most populous city in Saudi Arabia's western region (population of around two million people), where the holy mosque is located. Millions of pilgrims visit Makkah each year to perform Islamic rituals. As a result, the population has a wide range of social, cultural and educational backgrounds.

### Sample size

The sample size was calculated using a formula that includes the population size, a 95% confidence level, a 50% population proportion and a  $\pm 5\%$  error of margin. Altogether, 385 participants were expected to have 95% confidence that the obtained rate was within  $\pm 5\%$ . During the recruitment period, 600 respondents were invited to participate in the study. Of these, 83 respondents were excluded due to missing survey data or because they were under 18 years old. Thus, 517 participants were included in the study.

### Ethical approval

The study received approval from the ethics committee of the College of Medicine at Umm Al-Qura University (HAPO-02-K-012-2022-08-1157).

### Measures

The questionnaire included three parts. The first part concerned the participants' demographic characteristics, including their sex, age, nationality, marital status, education level, employment and monthly income, history of working in the medical field and smoking history. It also asked whether the participant was a pilgrim this year, had suffered a chronic disease (e.g., asthma, chronic obstructive pulmonary disease, heart disease, diabetes and hypertension) and had medical insurance. In the second part, the questions were adopted from Abu-Rish et al., (2016) study of knowledge of influenza, mode of transmission and preventive measures. The third part asked about the participants' knowledge of and attitudes toward vaccination uptake and barriers to the vaccine. The participants responded with one of three answers: "yes", "no" or "don't know".

### Calculation of the knowledge score

The knowledge domains in the current study consisted of 16 items and three subscales, including general knowledge of influenza and its vaccine ( $n=9$ ), mode of transmission ( $n=3$ ) and preventive measures ( $n=4$ ). The responses were "no", "yes" and "don't know" as before. The total knowledge score was computed by summing the correct responses for each participant; thus, the score ranged between 0 and 16. A good knowledge level was considered to be a score above the median.

### Statistical analysis

Statistical analysis was performed using RStudio. The frequencies and percentages were used to present categorical data, whereas numerical variables were presented as the median and interquartile range (IQR). The factors associated with good knowledge were explored using Pearson's Chi-squared test and Fisher's exact test. The significant factors from the bivariate analysis were used as the independent variables in a binary logistic regression analysis of having good knowledge. The results were presented as the odds ratio (OR) and 95% confidence intervals (95% CIs). A p-value of 0.05 was deemed statistically significant.

## 3. RESULTS

### Participants' characteristics

Out of the 517 participants, approximately half of the respondents were between the ages of 20 to 40 years (55.9%), were women (55.7%), were married (53.4%), and had obtained a university degree (56.9%). Unemployed participants represented 44.7% of the sample, whereas about one-third of the respondents (33.3%) had a monthly income of 5,000 to 15,000 SAR. Most of the respondents had no chronic diseases (72.9%) and 38.3% had medical insurance. The other demographic characteristics are listed in Table 1.

**Table 1** Participants' characteristics

Parameter	Category	N (%)
Sex	Male	229 (44.3%)
	Female	288 (55.7%)

Age (years)	<20	34 (6.6%)
	20 to 40	289 (55.9%)
	40 to 60	148 (28.6%)
	>60	46 (8.9%)
Nationality	Saudi	446 (86.3%)
	Non-Saudi	71 (13.7%)
Marital status	Single	197 (38.1%)
	Married	276 (53.4%)
	Widowed	16 (3.1%)
	Divorced	28 (5.4%)
Educational level	Illiterate	0 (0.0%)
	Primary school	3 (0.6%)
	Intermediate school	19 (3.7%)
	High school	103 (19.9%)
	University	294 (56.9%)
	Post-graduate	98 (19.0%)
Employment status	Unemployed	231 (44.7%)
	Government	165 (31.9%)
	Private	121 (23.4%)
Monthly income (SAR)	No income	130 (25.1%)
	<5,000	131 (25.3%)
	5,000 to 15,000	172 (33.3%)
	>15,000	84 (16.2%)
Working in the medical field	Yes	140 (27.1%)
Smoker	Yes	10 (1.9%)
Pilgrim this year	Yes	423 (81.8%)
Have a chronic disease	No chronic diseases	377 (72.9%)
	Asthma	19 (3.7%)
	COPD	5 (1.0%)
	Heart disease	8 (1.5%)
	Diabetes	33 (6.4%)
	Hypertension	31 (6.0%)
	Other	44 (8.5%)
Have medical insurance	Yes	198 (38.3%)

### Knowledge of influenza infection, transmission and prevention

The highest proportions of correct responses to the questions on the general knowledge of influenza were related to the increased risk of influenza infection among people with a chronic illness (73.9%) and that influenza is a contagious respiratory infection (73.3%). By contrast, the lowest percentages of correct answers were related that the influenza vaccine can cover the H1N1 virus, not the corona virus (28.4%) and that not every H1N1-infected person experience complication that need hospitalization (31.3%). The most frequently correct modes of influenza virus transmission included droplets resulting from sneezing, coughing or talking (91.1%), followed by close unprotected contact (88.2%). The highest proportions of correct preventive measures included covering the nose or mouth when sneezing (95.2%) and washing hands with water and soap after coughing/sneezing (94.0%, Table 2).

**Table 2** The frequencies and percentages of correct responses to the knowledge questions

Parameter	N (%)
General knowledge of influenza and its vaccine	
Influenza is a contagious respiratory infection that might cause a range of mild illness to serious pneumonia, and is	379 (73.3%)

caused by respiratory viruses such as H1N1 virus and corona virus	
Swine influenza is one type of influenza caused by the H1N1 virus	233 (45.1%)
Every H1N1-infected person experiences complications that need hospitalization	162 (31.3%)
Every H1N1-infected person dies because of it	290 (56.1%)
Medications are available for the treatment of serious cases of influenza	354 (68.5%)
People with chronic illness (e.g., asthma, COPD, heart disease, or diabetes) are at a higher risk of developing a more serious influenza illness	382 (73.9%)
The elderly (≥65 years of age) and children (≤5 years of age) are at a higher risk of developing a serious influenza illness	356 (68.9%)
The influenza vaccine covers the H1N1 virus but not corona virus	147 (28.4%)
The influenza vaccine should be given annually	341 (66.0%)
Mode of transmission	
Influenza can spread through close unprotected contact with respiratory droplets	456 (88.2%)
Influenza can spread through droplets made when people with influenza cough, sneeze, or talk	471 (91.1%)
Influenza can spread by touching one’s mouth or nose after contact with contaminated objects	425 (82.2%)
Preventive measures	
Wearing a mask can prevent the spread of influenza	476 (92.1%)
Covering your nose or mouth when sneezing can prevent the spread of influenza	492 (95.2%)
Washing hands with water and soap after coughing/sneezing can prevent the spread of influenza	486 (94.0%)
Avoiding crowded places can prevent the spread of influenza	478 (92.5%)

\*Correct responses are answered as “no”; otherwise, correct responses are answered as “yes”

**Knowledge score and factors linked to good knowledge**

Regarding the knowledge score, the results showed that the median (IQR) knowledge score was 12.0 (10.0 to 14.0) with minimum and maximum values of 0.0 and 16.0, respectively. A total of 27 participants (5.2%) provided correct responses to all the items. Based on the classification of those participants with good knowledge, the results showed that 218 participants (42.2%) had a good knowledge level (knowledge score > 12). Knowledge levels differed significantly based on the participants’ age (p=0.002), marital status (p=0.005), educational level (p<0.0001), working in the medical field (p<0.0001) and being a pilgrim in the current year (p<0.0001, Table 3). However, based on the regression analysis, the independent predictors of high knowledge included working in the medical field (OR=3.45, 95% CI, 2.20 to 5.47, p<0.0001) and being a pilgrim in the current year (2.32, 95% CI, 1.35 to 4.14, p=0.003, Table 4).

**Table 3** Factors linked to the participants’ knowledge

Parameter	Category	Poor N=299	Good N=218	P value
Sex	Man	125(41.8%)	104 (47.7%)	0.182
	Women	174(58.2%)	114 (52.3%)	

Age (years)	<20	24 (8.0%)	10 (4.6%)	0.002
	20 to 40	147(49.2%)	142 (65.1%)	
	40 to 60	94 (31.4%)	54 (24.8%)	
	>60	34 (11.4%)	12 (5.5%)	
Nationality	Saudi	251(83.9%)	195 (89.4%)	0.073
	Non-Saudi	48 (16.1%)	23 (10.6%)	
Marital status	Single	101(33.8%)	96 (44.0%)	0.005
	Married	163(54.5%)	113 (51.8%)	
	Widowed	14 (4.7%)	2 (0.9%)	
	Divorced	21 (7.0%)	7 (3.2%)	
Educational level	Illiterate	0 (0.0%)	0 (0.0%)	<0.001
	Primary school	3 (1.0%)	0 (0.0%)	
	Intermediate school	16 (5.4%)	3 (1.4%)	
	High school	63 (21.1%)	40 (18.3%)	
	University	178(59.5%)	116 (53.2%)	
	Post-graduate	39 (13.0%)	59 (27.1%)	
Employment status	Unemployed	141(47.2%)	90 (41.3%)	0.136
	Government	85 (28.4%)	80 (36.7%)	
	Private	73 (24.4%)	48 (22.0%)	
Monthly income	No income	82 (27.4%)	48 (22.0%)	0.100
	<5,000	75 (25.1%)	56 (25.7%)	
	5,000 to 5,000	103(34.4%)	69 (31.7%)	
	>15,000	39 (13.0%)	45 (20.6%)	
Working in the medical field	Yes	45 (15.1%)	95 (43.6%)	<0.001
Smoker	Yes	8 (2.7%)	2 (0.9%)	0.203
Pilgrim this year	Yes	225(75.3%)	198 (90.8%)	<0.001
Have a chronic disease	No chronic diseases	217(72.6%)	160 (73.4%)	
	Asthma	5 (1.7%)	14 (6.4%)	
	COPD	3 (1.0%)	2 (0.9%)	
	Heart disease	4 (1.3%)	4 (1.8%)	
	Diabetes	26 (8.7%)	7 (3.2%)	
	Hypertension	21 (7.0%)	10 (4.6%)	
	Other	23 (7.7%)	21 (9.6%)	
Have medical insurance	Yes	122(40.8%)	76 (34.9%)	0.170

**Table 4** Predictors of high knowledge (>12) of influenza infection and its vaccine

Parameter	Category	OR	95% CI	p-value
Age (years)	<20	—	—	
	20 to 40	1.04	0.41, 2.73	0.933
	40 to 60	0.88	0.32, 2.52	0.811
	>60	0.53	0.16, 1.75	0.295
Marital status	Single	—	—	
	Married	0.76	0.48, 1.22	0.253
	Widowed	0.29	0.04, 1.17	0.123
	Divorced	0.45	0.16, 1.18	0.118
Educational level*	Intermediate school	—	—	
	Primary school	NA	NA	0.980
	High school	4	0.95, 18.4	0.080
	University	3	0.75, 14.0	0.160



	Post-graduate	7	1.70, 35.7	0.012
Working in the medical field	No	—	—	
	Yes	3.45	2.20, 5.47	<0.001
Pilgrim this year	No	—	—	
	Yes	2.32	1.35, 4.14	0.003

\* The illiterate and primary school categories were not employed as reference categories because they had low frequencies

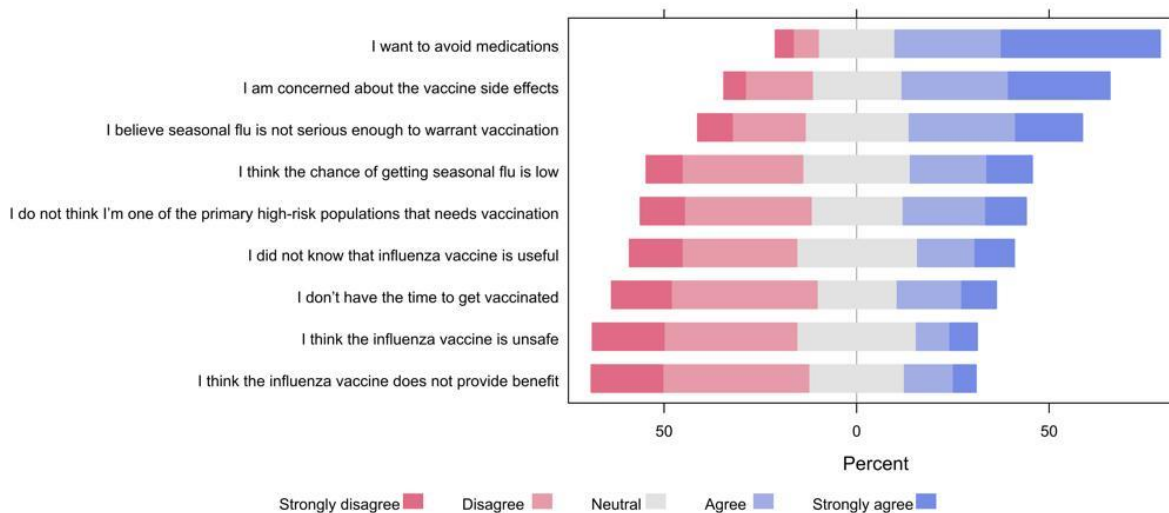
**Knowledge of and attitude toward vaccination uptake**

Altogether, 281 participants (54.4%) had received the vaccine. Most of them (74.1%) indicated that the vaccine should be given on an annual basis and that it is given intramuscularly (93.4%). Almost three-quarters of the respondents (73.5%) knew about its availability. Only 18.8% of them thought that the vaccine was contraindicated to the elderly and individuals with comorbidities. High proportions of the respondents believed that they are susceptible to seasonal flu (79.3%) and that the vaccine would provide benefits (77.4%). The need for more awareness of the vaccine among the public was stressed by 88.2% of the respondents (Table 5).

**Table 5** Knowledge of and attitude toward vaccination uptake

Parameter	Category	N (%)
Having influenza vaccine	No	236 (45.6%)
	Yes	281 (54.4%)
How often do you think influenza vaccines should be taken?	Every year	383 (74.1%)
	Once	134 (25.9%)
Did you know about the availability of the vaccine in health centres this season?	No	137 (26.5%)
	Yes	380 (73.5%)
How is the influenza vaccine administered?	Oral	34 (6.6%)
	Intramuscular	483 (93.4%)
Is the influenza vaccine contraindicated for people in old age and co morbidities?	No	420 (81.2%)
	Yes	97 (18.8%)
Do you believe you are susceptible to seasonal flu?	No	107 (20.7%)
	Yes	410 (79.3%)
Do you believe the influenza vaccine provides benefits?	No	117 (22.6%)
	Yes	400 (77.4%)
Do you think the public needs more awareness of the vaccine?	No	61 (11.8%)
	Yes	456 (88.2%)

**Barriers to seasonal influenza vaccine**



**Figure 1** Participants' responses to the perceived barriers to receiving the vaccine

### Barriers to receiving the vaccine

The most frequent barriers that the participants agreed or strongly agreed with were avoiding medications (68.9%), having concerns about its side effects (54.0%) and the belief that seasonal flu is not serious enough to warrant vaccination (45.3%). Conversely, more than a half of the respondents strongly disagreed or disagreed with the following barriers: Perception that the vaccine does not provide benefits (56.7%), lack of time to be vaccinated (53.4%) and perception that the vaccine is unsafe (53.2%, Figure 1).

## 4. DISCUSSION

One of the deadliest viral infections ever recorded, influenza is recognized for its sporadic cases and contagious outbreaks that claim the lives of numerous individuals globally. Strategies for prevention are essential for lowering infection rates and containing the spread of the disease. This shows that the public's acceptance of preventive measures is essential and that their knowledge, attitudes and behaviors influence that. The majority of research carried out to evaluate influenza knowledge and vaccine acceptability has been conducted among medical professionals (Abu-Gharbieh et al., 2010; Guillari et al., 2021; Haridi et al., 2015; Romani et al., 2011). Thus, the purpose of this study is to determine the Saudi population's knowledge of and attitudes toward influenza and its vaccine during the Omura and Hajj seasons in Makkah city, Saudi Arabia as well as identify the major determinants of and barriers to accepting the vaccine.

The study reported that more than half of the respondents (289, 55.9%) were aged 20 to 40 years and 446 (86.3%) were Saudis. Further, 276 (53.4%) were married and most respondents 294 (56.9%) had a university degree. Moreover, 140 (27.1%) were healthcare providers, 423 (81.8%) were pilgrims this year and 377 (72.9%) had not been diagnosed with any chronic diseases. According to the study's findings, around 70% of the respondents showed to have good knowledge that influenza is a respiratory infection that spreads quickly with an increased risk among people with chronic diseases. This result is lower rates than that in the study conducted in Amman, Jordan (Abu-Rish et al., 2016) in which 89.6% of the respondents were knowledgeable about it. This difference could be due to the use of different sample populations. However, in this study, approximately 90% of the respondents knew the correct mode of transmission and the correct preventive measures to avoid contracting influenza. These findings support previous research in Amman, Jordan, which found similar rates (Abu-Rish et al., 2016). Having good knowledge of and positive attitudes toward preventive measures have also been documented in previous research. According to Xiang and Colleagues, (2010) study in China, rural and urban people's concerns are both at a moderate level. They also found that a reasonable proportion of people, especially in villages, wash their hands thoroughly to avoid the spread of avian influenza (Xiang et al., 2010). However, another study found that a significant proportion of people were unaware of the avian influenza risk (Di Giuseppe et al., 2008).

The findings of this study indicated that the majority of the participants regarded their degree of susceptibility to influenza to be high. This shows that they were aware of their vulnerability to illness and sensitivity to influenza. If they accepted that they were vulnerable to influenza and might contract it, they would adopt preventive behaviors. Further, given their high level of perceived benefits, these behaviors would seem applicable and useful. However, as previously demonstrated in a study that evaluated vaccine adoption among healthcare personnel in Lebanon (Romani et al., 2011) the public's beliefs about and knowledge of influenza and its vaccine do not ensure the practice of vaccination.

Based on the knowledge scores, 218 (42.2%) of the study sample had a good knowledge level (knowledge score > 12). This finding was consistent with previous studies of influenza among the general populations in Jordan (Abu-Rish et al., 2016) and Saudi Arabia (Balkhy et al., 2010) which showed that 43.7–47.5% of the study sample were knowledgeable about influenza. However, in Italy (Di Giuseppe et al., 2008) approximately 60% of the sample from the general population were knowledgeable, whereas 21% of the respondents in a study in eastern China (Wendlandt et al., 2018) knew about the disease. Significant differences in the degree of knowledge have been observed by using different measures.

In this study, knowledge levels were statistically significant among those participants working in the medical field ( $p < 0.0001$ ). This result was similar to another study conducted in Makkah city (Haridi et al., 2017), which reported that approximately 80% of the respondents are knowledgeable, as they work in the medical field. Moreover, a study in Amman, Jordan (Abu-Rish et al., 2016) found that healthcare providers appeared to have better knowledge. In this study, a high degree of knowledge was associated with working in the medical field (OR=3.45, 95% CI, 2.20 to 5.47,  $p < 0.0001$ ) and being a pilgrim in the current year (2.32, 95% CI, 1.35 to 4.14,  $p = 0.003$ ). The healthcare facilities in Saudi Arabia, especially in Makkah city that care for pilgrims during the Omura and Hajj seasons, offer emergency care to high-risk patients, who are primarily older individuals with comorbid diseases. Healthcare providers in hospitals may be in danger of developing complex influenza if exposed to physically demanding situations. Therefore, the Ministry of Health recommends that all healthcare providers working in facilities that provide medical treatment to pilgrims and pilgrims who want to travel to Makkah have an influenza vaccination.



In this study, 281 (54.4%) of the respondents had received the vaccine and all of them were pilgrims this year. Moreover, 73.5% knew the vaccine is available. However, only 18.8% of them thought that the vaccine is contraindicated for the elderly and individuals with comorbidities, although 79.3% and 77.4% of the respondents believed that they are susceptible to seasonal flu and that the vaccine would provide benefits, respectively. The participants emphasized the important role of awareness campaigns about the vaccine among the public, as stressed by 88.2%, especially during the outbreak of COVID-19 on which most campaigns focus. The most often reported barriers in this study were avoiding medications (68.9%) having concerns about the side effects of the flu vaccine (54.0%) and the belief that seasonal flu is not serious enough to warrant vaccination (45.3%). These findings support those of previous research showing that concerns about contracting an illness after receiving the flu vaccine and a lack of awareness of influenza as a threat, followed by uncertainty about the vaccine's safety and effectiveness, are the most often stated barriers to vaccination (Abu-Rish et al., 2016). Based on this study findings, it is recommended that more effort be put into using mass media to raise awareness of influenza and that more educational campaigns are promoted to encourage receiving influenza vaccines and focus less on influenza awareness and its complications.

## 5. CONCLUSION

This study found that the Saudi population had a good level of knowledge of influenza, its mode of transmission and its preventive measures. About half of the participants received the influenza vaccine; most were healthcare providers and were pilgrims this year. The participants reported that the major reasons that prevent them from being vaccinated were avoiding medications, having concerns about its side effects and the belief that seasonal flu is not serious enough to warrant vaccination. Increasing the awareness of the Saudi population by promoting educational and vaccination campaigns about influenza and the efficacy of its vaccine are recommended.

### Authors' contributions

The corresponding author has contributed to all phases of the study from designing the study to the writing process and submission.

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### Conflict of interest

The authors declare that there is no conflict of interests.

### Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

## REFERENCES AND NOTES

1. Abu-Gharbieh E, Fahmy S, Rasool BA, Khan S. Influenza vaccination: Healthcare workers attitude in three Middle East countries. *Int J Med Sci* 2010; 7(5):319-25. doi: 10.7150/ijms.7.319
2. Abu-Rish EY, Elayeh ER, Mousa LA, Butanji YK, Albsoul-Younes AM. Knowledge, awareness and practices towards seasonal influenza and its vaccine: Implications for future vaccination campaigns in Jordan. *Fam Pract* 2016; 33(6):690-7. doi: 10.1093/fampra/cmw086
3. Ahmed A, Zeitounie R, Khandekar R. Impact of influenza vaccine in reduction of incidence and severity of influenza-like illness. *East Mediterr Health J* 2021; 27(9):884-891. doi: 10.26719/emhj.21.041.
4. Alfelali M, Barasheed O, Badahdah AM, Bokhary H, Azeem MI, Habeebullah T, Bakarman M, Asghar A, Booy R, Rashid H. Hajj Research Team. Influenza vaccination among Saudi Hajj pilgrims: Revealing the uptake and vaccination barriers. *Vaccine* 2018; 36(16):2112-8.
5. Algarni H, Memish ZA, Assiri AM. Health conditions for travellers to Saudi Arabia for the pilgrimage to Mecca (Hajj) - 2015. *J Epidemiol Glob Health* 2016; 6(1):7-9. doi: 10.1016/j.jegh.2015.07.001

6. Alghamdi RA. Prevalence and determinants of influenza immunization among diabetic patients attending Al-Eskan Primary Health Care Center in Makkah Al-Mokarramah, 2018. *Am J Med Sci* 2019; 7(3):120-7.
7. Alhajaji RJ, Raffa AM, Dawaji TA, Ali A, Miswak HM, Alshamrani AA, Gamloo WA, Albajaly JM, Alsulami FA, Mustafa R. Assessment of the prevalence of influenza immunization among diabetic patients attending primary health care center in makkah, Al-mokarramah 2019. *Eur J Mol Clin Med* 2019; 6(01).
8. Alhussain AA, Alhussain AA, Hammad SM, Elwan A. Uptake of influenza vaccine among type II diabetic patients in Arar city, Saudi Arabia. *Med Sci* 2021; 25(108):410-23.
9. Alicino C, Iudici R, Barberis I, Paganino C, Cacciani R, Zacconi M, Battistini A, Bellina D, Di Bella AM, Talamini A, Sticchi L, Morando A, Ansaldi F, Durando P. Influenza vaccination among healthcare workers in Italy. *Hum Vaccin Immunother* 2015; 11(1):95-100. doi: 10.4161/hv.34362
10. Alqahtani AS, Bondagji DM, Alshehari AA, Basyouni MH, Alhawassi TM, BinDhim NF, Rashid H. Vaccinations against respiratory infections in Arabian Gulf countries: Barriers and motivators. *World J Clin Cases* 2017; 5(6):212. doi: 10.12998/wjcc.v5.i6.212
11. Alwihat SA, Alqurashi AM, Alotaibi MM, Almalky JH. Assessment of knowledge and attitudes of patients attending in primary health care about the seasonal influenza immunization at Makkah, Al-Mokarramah 2019. *Eur J Mol Clin Med* 2019; 6(01).
12. Assaf AM, Hammad EA, Haddadin RN. Influenza vaccination coverage rates, knowledge, attitudes and beliefs in Jordan: A comprehensive study. *Viral Immunol* 2016; 29(9):516-25. doi: 10.1089/vim.2015.0135
13. Balkhy HH, Abolfotouh MA, Al-Hathloul RH, Al-Jumah MA. Awareness, attitudes and practices related to the swine influenza pandemic among the Saudi public. *BMC Infect Dis* 2010; 10(1):1-7.
14. Cate TR. Clinical manifestations and consequences of influenza. *Am J Med* 1987; 82(6):15-9. doi: 10.1016/0002-9343(87)90555-9
15. Di Giuseppe G, Abbate R, Albano L, Marinelli P, Angelillo IF. A survey of knowledge, attitudes and practices towards avian influenza in an adult population of Italy. *BMC Infect Dis* 2008; 8(1):1-8.
16. Fiore AE, Bridges CB, Cox NJ. Seasonal influenza vaccines. *P Flu* 2009; 43-82. doi: 10.1007/978-3-540-92165-3\_3
17. Guillari A, Polito F, Pucciarelli G, Serra N, Gargiulo G, Esposito MR, Botti S, Rea T, Simeone S. Influenza vaccination and healthcare workers: Barriers and predisposing factors. *Acta Biomed* 2021; 92(S2):e2021004. doi: 10.23750/abm.v92iS2.11106
18. Haridi HK, Salman KA, Basaif EA, Al-Skaibi DK. Influenza vaccine uptake, determinants, motivators and barriers of the vaccine receipt among healthcare workers in a tertiary care hospital in Saudi Arabia. *J Hosp Infect* 2017; 96(3):268-75. doi: 10.1016/j.jhin.2017.02.005
19. Khdary NH, Alalem MA, Turkistan AM, Alghamdi SS. An Epidemiological study on influenza A (H1N1) in Makkah. *Adv Infect Dis* 2014; 4(04):198-206. doi: 10.4236/aid.2014.44028
20. Korani MF. Assessment of seasonal flu immunization status among adult patients visiting Al-Sharaee Primary Health Care Center in Makkahal-Mokarramah. *Int J Med Sci Public Health* 2015; 4(1):117-23. doi: 10.5455/ijmsph.2015.0000201420
21. Memish ZA, Assiri AM, Alshehri M, Hussain R, Alomar I. The prevalence of respiratory viruses among healthcare workers serving pilgrims in Makkah during the 2009 influenza A (H1N1) pandemic. *Travel Med Infect Dis* 2012; 10(1):18-24.
22. Moghadami M. A Narrative Review of Influenza: A Seasonal and Pandemic Disease. *Iran J Med Sci* 2017; 42(1):2-13.
23. Mzjaji AI, Raffa AM, Albarakati MH, Dosh YA, Doshi AA, Alraddadi ZY, Alahmdi MH, Sufyani MM, Al-Omairy FH, Alzahrani SM, Kanouri HA. Assessment of the knowledge and attitudes regarding of seasonal influenza and influenza vaccination among diabetic patients in Diabetic Care Center in Makkah, Al-Mokarramah 2021. *Ann Rom Soc Cell Biol* 2021; 25(7):2066-80.
24. Rachiotis G, Mouchtouri VA, Kremastinou J, Gourgoulis K, Hadjichristodoulou C. Low acceptance of vaccination against the 2009 pandemic influenza A(H1N1) among healthcare workers in Greece. *Euro Surveill* 2010; 15(6):19486.
25. Romani MH, Musharrafieh UM, Lakkis NA, Hamadeh GN. Family physicians beliefs and attitudes regarding adult pneumococcal and influenza immunization in Lebanon. *Fam pract* 2011; 28(6):632-7.
26. Stohr K. Influenza-WHO cares. *Lancet Infect Dis* 2002; 2(9):517. doi: 10.1016/S1473-3099(02)00366-3
27. Wendlandt R, Cowling BJ, Chen Y, Havers F, Shifflett P, Song Y, Zhang R, Iuliano D, Xu C, Yu H, Zhang J. Knowledge, attitudes and practices related to the influenza virus and vaccine among older adults in Eastern China. *Vaccine* 2018; 36(19):2673-82.
28. Xiang N, Shi Y, Wu J, Zhang S, Ye M, Peng Z, Zhou L, Zhou H, Liao Q, Huai Y, Li L, Yu Z, Cheng X, Su W, Wu X, Ma H, Lu J, McFarland J, Yu H. Knowledge, attitudes and practices (KAP) relating to avian influenza in urban and rural areas of China. *BMC Infect Dis* 2010; 10:34. doi: 10.1186/1471-2334-10-34