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Research Article

SEASONAL INFLUENZA: KNOWLEDGE, ATTITUDE AND VACCINE UPTAKE AMONG ADULT VISITORS OF PRIMARY HEALTHCARE CENTERS, TAIF, SAUDI ARABIA

Running title: Seasonal influenza: Knowledge, attitude and vaccine uptake

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Abstract

Background: Seasonal Influenza vaccination is the suitable tool to reduce the risk of hospitalization and death from complications of influenza in vulnerable patients (patients with chronic diseases, elderly, pregnant women and children). **Objectives:** To explore the knowledge and attitude about influenza virus and its vaccine as well as to estimate the uptake status of seasonal influenza vaccination and its determinants among adult patients. **Patients and methods:** A cross sectional design was implemented in Taif city, Western Saudi Arabia among a random sample of adult patients aged between 18 and 65 years attended the primary health care centers affiliated to Ministry of health. A self administered structured validated questionnaire was used for collecting data. **Results:** A total of 340 adult patients were included in the study. More than half of them (53.5%) were females. Their age ranged between 18 and 65 years with an arithmetic mean of 40.2 years and standard deviation of 13.3 years. Vast majority (99.1%) of the participants were aware about vaccination. The most frequently reported sources of awareness about vaccination were healthcare professionals (22.8%), and family/relatives/friends (18.4%). The total knowledge score ranged between 4 and 12, out of a maximum possible of 13. The median and (IQR) were 8 (8-9). Younger ($p=0.007$), higher educated ($p=0.001$), divorced participants ($p=0.006$), those had their information about vaccination from the community ($p=0.037$) and participants without history of chronic health problems ($p=0.009$) were more knowledgeable. The total attitude score ranged between 0 and 8, out of a maximum possible of 10. The median and (IQR) were 3 (2-5). Saudi participants ($p=0.019$), higher educated ($p<0.001$), participants who had their information about vaccination from the healthcare professionals ($p<0.001$) and non smokers ($p<0.001$) were more likely to express positive attitude towards influenza and its vaccine compared to others. History of receiving a vaccination against influenza in the last season was mentioned by 37.4% of the participants. Females were at lower significant probability of not receiving the vaccine compared to males (Adjusted odds ratio "AOR"=0.35; 95% confidence interval "CI: 0.25-0.81, $p=0.008$). Compared to primary school educated participants, those with Diploma or Bachelor degrees were at higher risk for not receiving the vaccine (AOR=14.77; 95% "CI: 2.39-91.45, $p=0.004$ and AOR=3.46; 95% CI: 1.28-9.38, 0.014, respectively). Compared to singles, divorced participants were less likely to not receive the vaccine (AOR=0.23; 95% "CI: 0.09-0.58, $p=0.002$). Participants with higher knowledge or attitude scores were less likely to not receive the vaccine (AOR=0.64; 95% "CI: 0.56-0.75, $p<0.001$ and AOR=0.060, 95% CI: 0.49-0.75, $p<0.001$, respectively). **Conclusion:** Uptaking of vaccination against influenza in the last season was far below the recommended rate. However, participants with higher knowledge or attitude were more likely to receive the vaccine than their counterparts.

Keywords: Seasonal influenza, Vaccine, Knowledge, Attitude, Uptake

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INTRODUCTION:

Influenza is an infectious respiratory human illness that caused by influenza viruses (A and B). These viruses can spread easily by droplets through direct contact with infected individuals, contact with contaminated objects and by inhalation of virus-laden aerosols.^[1] It can cause mild to very severe illness, characterized by a sudden onset of fever, headache, cough (usually dry), musculoskeletal and joint pain, severe malaise, sore throat and a running nose. A cough can be severe and can last at least two weeks. Most people recover from these symptoms within a week without requiring medical attention. But in high-risk people can cause severe illness or even death.^[2]

Both types of influenza virus can lead to seasonal influenza epidemics. In addition, Influenza A virus can generate worldwide pandemics such as the 2009 H1N1 global outbreak that associated with many deaths all over world.^[1] Moreover, every year, epidemics of seasonal influenza can affect between 3 and 5 millions in the form of severe illness and lead to between 250 to 500 thousands of deaths worldwide.^[1]

Seasonal influenza is considered a significant public health problem as it leads to loss of workforce productivity as a result of sick leave and consequently strains health services.^[3]

Seasonal Influenza vaccination is the suitable tool to reduce the risk of hospitalization and death from complications of influenza in vulnerable patients (patients with chronic diseases, elderly, pregnant women and children).^[4] Annual influenza vaccination for all adults is recommended, particularly those with chronic diseases because it is effective and safe.^[5] Furthermore, Center for Disease Control and Prevention (CDC) and the World Health Organization (WHO) recommended that people starting from age of 6 months and onwards are encouraged to have vaccinated against influenza to expand protection to other more people.^[6,7]

Despite the evidence of effectiveness of seasonal influenza vaccine, its coverage in general is still low, particularly for vulnerable group of patients in many parts of the world.^[8]

Numerous reasons have been identified in various studies for accepting seasonal influenza vaccination includes elderly, good knowledge toward influenza and its vaccine and presence of chronic disease whereas reasons for refusing the vaccine includes fear from vaccine side effects and loss of confidence in the vaccine efficacy.^[9-11]

Ministry of Health (MOH) in the Kingdom of Saudi Arabia (KSA) recommends that international pilgrims be vaccinated against seasonal influenza with most recently available vaccines before arrival, particularly those at increased risk of severe influenza disease including individuals with pre-existing health conditions.^[12]

The variation in the seasonal influenza vaccine uptake rate across countries is a reflection of the level of knowledge and attitude toward the vaccine, both in the general population and in the at-risk groups as people with insufficient knowledge and/or negative attitude are usually less likely to be vaccinated.^[3, 13-15] This study aimed to explore the knowledge and attitude about influenza virus and its vaccine as well as to estimate the uptake status of seasonal influenza vaccination and its determinants among adult patients in Taif, Saudi Arabia

SUBJECTS AND METHODS:

A cross sectional study was implemented in Taif city, which located in Makkah Province at the western region of Saudi Arabia with an estimated population of 683,000 (2019 estimated census).^[16] Taif city includes 19 primary health care centers belonging to Ministry of health where the study was specifically conducted. Adult patients aged between 18 and 65 years attending the primary health care centers

affiliated to Ministry of health in Taif (n=19) constituted the target population.

The sample size was computed utilizing the statistical formula for a cross-sectional survey^[17]:

$$n = Z^2 \cdot XPXQ / D^2$$

Based on the following values

n: Calculated sample size

Z: The z-value for the selected level of confidence = 1.96.

P: Estimated prevalence of seasonal influenza uptake among adult population =27.6% (~0.28) based on a previous study carried out among adult population in Lebanon.^[3]

$$Q: (1 - P) = 72.4\% (~0.72)$$

D: The maximum acceptable error = 0.05.

Giving a sample of 309 adults with 10% was added to the total sample size for the non-respondents. Thus a total of almost 340 participants were invited to participate in the study.

Multi-stage random sampling technique was adopted. In the first stage, two geographical regions from Taif were selected out of the four (East, West, North and South). In the second stage, 2 primary healthcare centers were selected from each region by simple random technique. In the last stage, 85 adult patients attending these PHCCs during the period of data collection were selected by systematic random technique according to number of patients visiting each center daily.

A self administered structured questionnaire was used for collecting data. It has been previously used in Italy and proved for validity and reliability.^[18] It is composed of five main sections:

-Socio-demographic characteristics: Age, gender, nationality, educational level, marital status, number of children, job status, family income, smoking, and chronic diseases history (duration, medical treatment and co-morbidity, number of physician visits in the past 12 months, and self-reported health status).

-Awareness and source of information about vaccination.

-Knowledge regarding vaccination of infectious diseases and Subjects that are at higher risk of developing severe forms of influenza. Correct answers were assigned a score of "1" while incorrect answers were assigned a score of "0". Total score was computed, tested for normality by Shapiro-Wilk test and used for comparisons.

-Attitude towards influenza and its vaccine, including concerns about adverse effects, benefits and safety of the vaccine. A 10-point scale ranging from 1 to 10 was used to assess perceived severity, frequency and preventability of the disease whereas 'agree',

'disagree', or 'unsure'; response options was utilized to assess intention to be vaccinated in the future and 'yes' and 'no response options was used for patients' reasons;

-Behaviors regarding influenza and others vaccination in the last five years (whether or not they had received vaccination).

The researcher visited the selected PHC centers after getting approvals and explained the purpose of the study to all physicians and patients chosen for the study. Approximately 15-20 patients were recruited daily. Thus, one working week was needed to complete the data from each center. Questionnaires were distributed on selected patients while waiting for physicians' appointment and collected after half an hour. The data collection was implemented at regular day working hours. A trained female nurse helped in data collection from female patients.

Written permission from Program of Family Medicine in Taif Region was obtained before conducting the research. In addition, written permission from the director of the primary care, MOH in Taif was obtained as well as permission of all PHCCs directors were requested verbally. Before giving questionnaires to participants, informed consent was asked from all of the chosen subjects then, all of them had the right not to participate in the study or to withdraw from the study prior to completion.

Descriptive statistics in the form of mean and standard deviation (SD) or median and interquartile range (IQR) continuous variables (according to their distribution) and frequency and percentage for qualitative variables were done. Analytical statistics were performed using chi-square test to test for association of categorical variables, Mann-Whitney test and Kruskal-Wallis test to compare abnormally distributed variables between two or more than two groups, respectively. Statistical Package for Social Sciences (SPSS) version 26 software statistical program was utilized for data description and analysis and p-value <0.05 was used as a cut off for statistical significance.

RESULTS:

A total of 340 adult patients were included in the study. Their socio-demographic information is presented in Table 1. More than half of them (53.5%) were females. Their age ranged between 18 and 65 years with an arithmetic mean of 40.2 years and standard deviation of 13.3 years. Most of them (76.8%) were Saudi nationals. Bachelor holders represented 41.8% of the participants and married

represented 46.5% of them. History of chronic health problems was reported by 45.3% of the participants. Among them, the most frequently reported diseases

were diabetes (50%), and hypertension (40.3%). History of smoking was reported by 27.6% of the participants.

Table 1: Socio-demographic information of the participants (n=340)

	Frequency	Percentage
Gender		
Male	158	46.5
Female	182	53.5
Age in years		
Range	18-65	
Mean±SD	40.2±13.3	
Nationality		
Saudi	261	76.8
Non-Saudi	79	23.2
Highest level of education		
Primary school	38	11.2
Intermediate school	31	9.1
High school	99	29.1
Diploma	18	5.3
Bachelor	142	41.8
Master/Doctorate	12	3.5
Marital status		
Single	106	31.2
Married	158	46.5
Divorced	46	13.5
Widowed	30	8.8

SD: Standard deviation

Vast majority (99.1%) of the participants were aware about vaccination. The most frequently reported sources of awareness about vaccination were healthcare professionals (22.8%), family/relatives/friends (18.4%), mass media (17.8%) and social media (16.9%).

Knowledge about vaccination

-Vaccination of infectious diseases

Majority of the participants could recognize that there is a vaccine against influenza (96.8%) while there are no vaccines against AIDS/HIV (97.9%), heart attack (96.2%) and hepatitis C (89.4%). On the other hand, minority of them could recognize that there is a vaccine against Shingles (11.2%) and pneumonia (30.3%). Table 2

Table 2: Knowledge about vaccination of infectious diseases among the participants

Diseases	Correct answers		
	Right response	No.	%
Influenza	True	329	96.8
Pneumonia	True	103	30.3
Shingles	True	38	11.2
AIDS/HIV	False	333	97.9
Hepatitis C	False	304	89.4
Heart attack	False	327	96.2
Cold	False	224	65.9

-Subjects at higher risk of developing severe forms of influenza

From Table 3, it is clear that majority of the participants (96.5%) could recognize that healthy young adults are not at risk for developing severe forms of influenza while 75.9%, 50% and 31.2% could recognize that elderly subjects (≥ 65 years old), those aged < 64 years with chronic conditions and pregnant women are at risk for developing severe forms of influenza, respectively.

Table 3: Knowledge of the participants regarding subjects at higher risk of developing severe forms of influenza

Subjects	Correct answers		
	Right response	No.	%
Children < 6 months old	False	208	61.2
Children and young persons (5-18 years)	True	117	34.4
< 64 years old with chronic conditions	True	170	50.0
Healthy young adults	False	328	96.5
Elderly (≥ 65 years old)	True	258	75.9
Pregnant women	True	106	31.2

Overall, the total knowledge score ranged between 4 and 12, out of a maximum possible of 13. It was abnormally distributed as the p-value of Shapiro-Wilk test was < 0.001 . The median and (IQR) were 8 (8-9). Figure 1

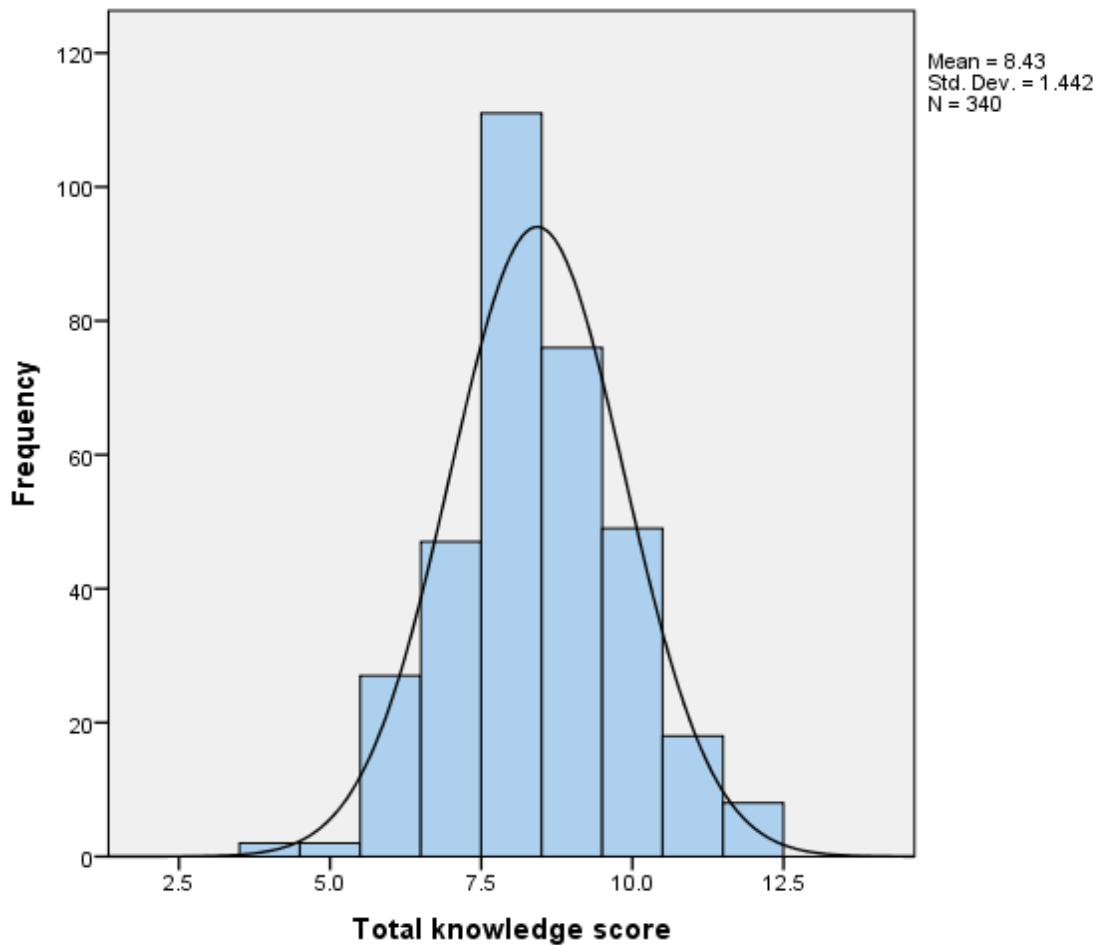


Figure 1: Total knowledge score of the participants about vaccination of infectious diseases and subjects at more risk for severe forms of influenza

There was a statistically significant negative correlation between participants' age and their knowledge score about influenza vaccination (Spearman's $r=-0.146$, $p=0.007$). Master or Doctorate holders had the highest knowledge score (mean rank=240.54) whereas those primary school graduated had the lowest score (mean rank=133.55), $p=0.001$. Divorced participants expressed the highest knowledge score (mean rank=212.27) while widowed participants had the lowest score (mean rank=138.92), $p=0.006$. Participants who had their information about vaccination from the community expressed the highest knowledge score (mean rank=217.18) whereas those who had their information from family/relatives/friends had the lowest score (mean rank=140.01), $p=0.037$. Participants with history of chronic health problems had lower significant knowledge score compared to those without such history (mean ranks were 155.57 and 182.86, respectively), $p=0.009$. Table 4

Table 4: Factors associated with knowledge of the participants about vaccination

	Total knowledge score			p-value
	Median	IQR	Mean rank	
Gender				
Male	8	7-10	175.78	0.343*
Female	8	8-9	165.91	
Age in years	Spearman's $r^{\circ}=-0.146$			0.007
Nationality				
Saudi	8	8-9	174.42	0.170*
Non-Saudi	8	8-9	157.56	
Highest level of education				
Primary school	8	7-8.25	133.55	0.001**
Intermediate school	9	8-10	193.29	
High school	8	7-9	156.62	
Diploma	9	8.75-9.25	214.17	
Bachelor	8	8-10	173.63	
Master/Doctorate	9	9-10	240.54	
Marital status				
Single	8	8-9	163.59	0.006**
Married	8	8-9	168.97	
Divorced	9	8-10	212.27	
Widowed	8	7-8	138.92	
Source of information (n=337)				
Mass media	8	8-9	146.09	0.037**
Internet	9	7-10	174.80	
Social media	9	8-10	189.96	
Family/relatives/friends	8	7-9	140.01	
Books/newspapers/magazines	9	7-10	181.46	
Healthcare professionals	8	8-10	172.80	
Community	10	8-10	217.18	
Others	9	8.25-9.75	206.88	
More than one source	8	8-9	163.58	
History of chronic health problems				
No	9	8-10	182.86	0.009*
Yes	8	7-9	155.57	
History of smoking				
No	8	8-9	167.16	0.298*
Yes	8	8-10	179.24	

IQR: Interquartile range

*Mann-Whitney test

**Kruskal-Wallis test

r° : Coefficient of correlation

Attitude towards influenza and its vaccination

Majority of the participants (80.3%) disagreed with the statement that influenza is a rare disease, while only 30.9% of them considered it as a serious disease and 64.7% considered it preventable disease. Table 5

Table 5: Attitude of the participants towards seriousness of influenza viral infection

Statements	Agree N (%)	Uncertain N (%)	Disagree N (%)
Influenza is rare	5 (1.5)	62 (18.2)	273 (80.3)
Influenza is serious	105 (30.9)	59 (17.4)	176 (51.8)
Influenza may be prevented	220 (64.7)	59 (17.4)	61 (17.9)

On a scale of 1 to 10, the mean value of the perceived worries about developing influenza was 2.67, with 15% of values ≥ 6 indicating being at risk. Regarding believe of the participants that vaccination prevent influenza, the mean score was 4.61, with 41.2% of values ≥ 6 indicating considering the vaccine as useful. Regarding believes of the participants that influenza vaccination is dangerous; the mean score was 2.76, with 16.2% of values ≥ 6 indicating considering influenza as a dangerous disease. Table 6

Table 6: Measurement of attitude of the participants towards influenza and its vaccine on a scale ranged between 1 and 10.

	Mean	At risk (≥ 6) N (%)
Worried about developing influenza	2.67	51 (15.0)
	Mean	Useful (≥ 6) N (%)
Believe vaccination to prevent influenza	4.61	140 (41.2)
	Mean	Dangerous (≥ 6) N (%)
Believe influenza vaccination to be dangerous	2.76	55 (16.2)

About one-third (32.9%) of the participants were intended to receive seasonal influenza vaccine in the next winter whereas 21.5% of them were not sure about that. Overall, the total attitude score ranged between 0 and 8, out of a maximum possible of 10. It was abnormally distributed as the p-value of Shapiro-Wilk test was <0.001 . The median and (IQR) were 3 (2-5). Figure 2

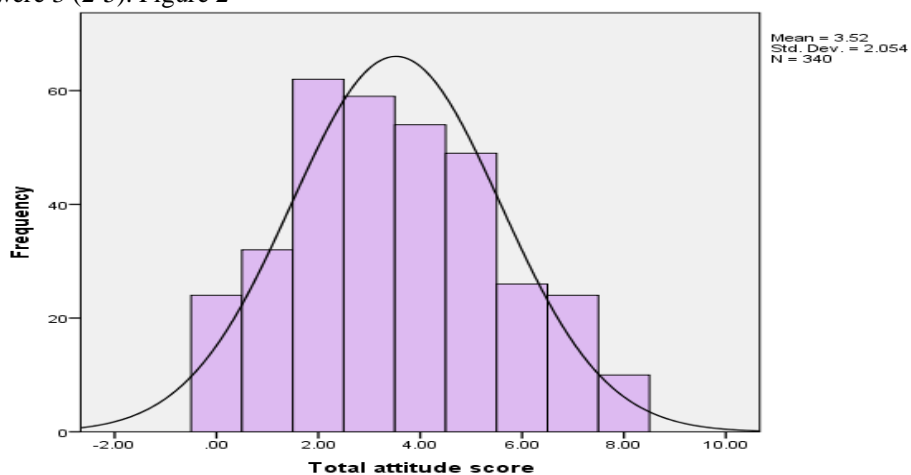


Figure 2: Total attitude score of the participants towards seasonal influenza vaccination

Saudi participants expressed more positive attitude towards influenza and its vaccination compared to non-Saudi nationals (mean rank=177.33 vs. 147.95), $p=0.019$. Master/Doctorate's holders had the highest attitude score (mean rank=298.96) while Diploma holders had the lowest attitude score (mean rank=136.31), $p<0.001$. Participants who had their information about vaccination from the healthcare professionals expressed the highest attitude score (mean rank=236.75) whereas those who had their information from social media had the lowest score (mean rank=123.88), $p<0.001$. Non smokers were more likely than smokers to express positive attitude towards influenza and its vaccine (mean ranks were 183.39 and 136.77, respectively), $p<0.001$. Table 7

Table 7: Factors associated with attitude of the participants towards seasonal influenza vaccination

	Total attitude score			p-value
	Median	IQR	Mean rank	
Gender				
Male	3	2-5	166.99	0.535*
Female	3	2-5	173.55	
Age in years	Spearman's $r^2=0.045$			0.413
Nationality				
Saudi	4	2-5	177.33	0.019*
Non-Saudi	3	2-5	147.95	
Highest level of education				
Primary school	4.5	3-6	212.03	<0.001**
Intermediate school	3	2-5	172.90	
High school	3	2-4	138.98	
Diploma	2.5	0-5	136.31	
Bachelor	4	2-5	174.32	
Master/Doctorate	7	6-7	298.96	
Marital status				
Single	3	2-5	164.13	0.145**
Married	4	2-5	178.86	
Divorced	2.5	2-4.25	145.90	
Widowed	3.5	2-5.25	186.72	
Source of information (n=337)				
Mass media	4	2-6	187.94	<0.001**
Internet	2	1-4	137.89	
Social media	3	1-4	123.88	
Family/relatives/friends	3	2-4	160.0	
Books/newspapers/magazines	4	2-6	199.09	
Healthcare professionals	5	4-7	236.75	
Community	3	1-4	132.41	
Others	4	2-5	178.54	
More than one source	5	3-6	210.61	
History of chronic health problems				
No	4	2-5	170.49	0.999*
Yes	3	2-5	170.51	
History of smoking				
No	4	2-5	183.39	<0.001*
Yes	2	1-4	136.77	

IQR: Interquartile range

*Mann-Whitney test

**Kruskal-Wallis test

r^2 : Coefficient of correlation

Uptaking of seasonal influenza vaccine

History of receiving a vaccination against influenza in the last season was mentioned by 37.4% of the participants. Among those who did not receive the vaccine, the most common reported causes were unsure of vaccine effectiveness (22.5%), fear of side effects (16.4%) and fear of needles (13.6%). Figure 3

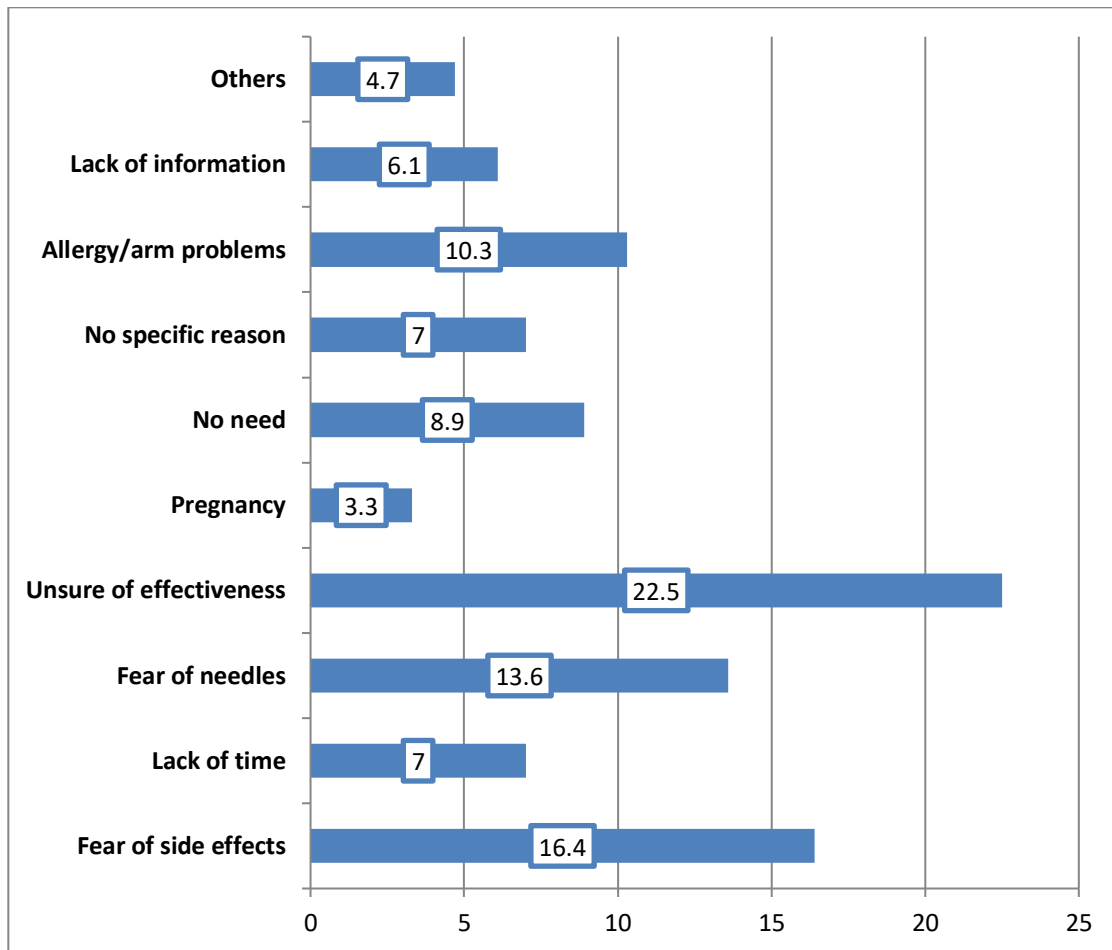


Figure 3: Reasons of not receiving a vaccination against influenza in the last season among the participants (n=2013)

Females were more likely than males to uptake seasonal influenza vaccine (42.9% vs. 31%), $p=0.024$. Saudi nationals were more likely than non-Saudis to uptake seasonal influenza vaccine (41.4% vs. 24.1%), $p=0.005$. Majority of Master/Doctorate's holders (91.7%) compared to only 11.1% of intermediate Diploma holders reported uptaking of seasonal influenza vaccine in the last season, $p<0.001$. Divorced participants were more likely than singles to uptake seasonal influenza vaccine (56.5% vs. 26.4%), $p=0.005$. Smokers were less likely to be vaccinated compared to non-smokers (25.5% vs. 41.9%), $p=0.005$. People who received their information about vaccine from books/newspapers/magazines (55.9%), mass media (50%) and family/relatives/friends (50%) were more likely to uptake the vaccine than those who received information from the internet (4.3%) and the community (none), $p<0.001$. Uptaking of seasonal influenza vaccine was significantly associated with better knowledge and positive attitude towards the vaccine, $p<0.001$. Table 8

Table 8: Factors associated with uptaking of seasonal influenza vaccine among the participants

	Uptake of seasonal influenza vaccine last season		p-value
	No N=213 N (%)	Yes N=127 N (%)	
Gender			
Male (n=158)	109 (69.0)	49 (31.0)	0.024*
Female (n=182)	104 (57.1)	78 (42.9)	
Age in years			
Mean±SD	39.7±13.5	41.2±12.9	0.314**
Nationality			
Saudi (n=261)	153 (58.6)	108 (41.4)	0.005*
Non-Saudi (n=79)	60 (75.9)	19 (24.1)	
Highest level of education			
Primary school (n=38)	18 (47.4)	20 (52.6)	<0.001*
Intermediate school (n=31)	9 (29.0)	22 (71.0)	
High school (n=99)	73 (73.7)	26 (26.3)	
Diploma (n=18)	16 (88.9)	2 (11.1)	
Bachelor (n=142)	96 (67.6)	46 (32.4)	
Master/Doctorate	1 (8.3)	11 (91.7)	
Marital status			
Single (n=106)	78 (73.6)	28 (26.4)	0.005*
Married (n=158)	96 (60.8)	62 (39.2)	
Divorced (n=46)	20 (43.5)	26 (56.5)	
Widowed (n=30)	19 (63.3)	11 (36.7)	
Source of information (n=337)			
Mass media (n=48)	24 (50.0)	24 (50.0)	<0.001*
Internet (n=23)	22 (95.7)	1 (4.3)	
Social media (n=55)	44 (80.0)	11 (20.0)	
Family/relatives/friends (n=62)	31 (50.0)	31 (50.0)	
Books/newspapers/magazines (n=34)	15 (44.1)	19 (55.9)	
Healthcare professionals (n=76)	45 (59.2)	31 (40.8)	
Community (n=11)	11 (100)	0 (0.0)	
Others (n=8)	4 (50.0)	4 (50.0)	
More than one source (n=19)	14 (73.7)	5 (26.3)	
History of chronic health problems			
No (n=186)	124 (66.7)	62 (33.3)	0.092
Yes (n=154)	89 (57.8)	65 (42.2)	
History of smoking			
No (n=246)	143 (58.1)	103 (41.9)	0.005
Yes	70 (74.5)	24 (25.5)	
Knowledge about vaccines			
Median (IQR)	8 (7-9)	9 (8-10)	<0.001°
Attitude towards vaccine			
Median (IQR)	4 (2-5)	5 (4-8)	<0.001°

*Chi-square test

**Student t`-test

IQR: Interquartile range

°Mann-Whitney test

Multivariate logistic regression analysis revealed that females were at lower significant probability of not receiving the vaccine compared to males (Adjusted odds ratio “AOR”=0.35; 95% confidence interval “CI: 0.25-0.81, p=0.008). Compared to primary school educated participants, those with Diploma or Bachelor degrees were at higher risk for not receiving the vaccine (AOR=14.77; 95% “CI: 2.39-91.45, p=0.004 and AOR=3.46; 95% CI: 1.28-9.38, 0.014, respectively). Compared to singles, divorced participants were less likely to not receive the vaccine (AOR=0.23; 95% “CI: 0.09-0.58, p=0.002). Participants with higher knowledge or attitude scores were less likely to not receive the vaccine (AOR=0.64; 95% “CI: 0.56-0.75, p<0.001 and AOR=0.60, 95% CI: 0.49-0.75, p<0.001, respectively). Participants` nationality, source of information and smoking history were not significantly associated with uptaking of the vaccine after controlling for confounding effect. Table 9

Table 9: Predictors of not receiving seasonal influenza vaccine among the participants

	Adjusted odds ratio	95% confidence interval	p-value
Gender			
Male ^a	1.0		
Female	0.35	0.25-0.81	0.008
Highest level of education			
Primary school ^a	1.0		
Intermediate school	0.49	0.14-1.68	0.255
High school	2.19	0.77-6.21	0.139
Diploma	14.77	2.39-91.45	0.004
Bachelor	3.46	1.28-9.38	0.014
Master/Doctorate	0.37	0.04-3.83	0.407
Marital status			
Single ^a	1.0		
Married	0.66	0.34-1.29	0.223
Divorced	0.23	0.09-0.58	0.002
Widowed	1.86	0.54-6.44	0.328
Knowledge about vaccines	0.64	0.56-0.75	<0.001
Attitude towards vaccine	0.60	0.49-0.75	<0.001

^a Reference category

Terms of nationality, source of information and smoking history were not significant and accordingly removed from the final model.

DISCUSSION:

Despite it has been documented that annual vaccination against seasonal influenza has been proved to be effective in decreasing influenza-related morbidity and mortality, [19, 220] particularly in older persons. [21, 22] and in decreasing health-related costs, [23-25] the availability of the vaccines as well as its regular uptake rates are still far from the recommended coverage target suggested by both national and international institutions (75%). [26-29] In this context, the current study was conducted to assess the knowledge and attitude about influenza virus and its vaccine as well as to estimate the uptake status of seasonal influenza vaccination and its determinants among adult patients attending the primary health care centers affiliated to Ministry of health in Taif city, Western Saudi Arabia.

In the present study, majority of the participants could recognize that there is a vaccine against influenza (96.8%), which is higher than the rate

reported in similar studies carried out in Australia (85.9%),^[30] Italy (64.7%),^[18] and United states (19.6%),^[31] and France (39%),^[32] which could reflect presence of good efforts in Saudi Arabia to alert people about the existence of influenza vaccines. Additionally, 96.5% of people could recognize that healthy young adults are not at risk for developing severe forms of influenza while 75.9%, 50% and 31.2% could recognize that elderly subjects (≥ 65 years old), those aged < 64 years with chronic conditions and pregnant women are at risk for developing severe forms of influenza, respectively. Comparable findings were reported from studies carried out in Italy,^[18] However in another Italian study, 64.2% of pregnant women could recognized that pregnant women are at higher for dangerous effects of influenza than not pregnant women^[33].

In accordance with others,^[18, 34] higher educated individuals were more knowledgeable about influenza and influenza vaccine. Also, knowledge

was more defective in older people, and those with history of chronic diseases, who really need this type of vaccination.^[21, 22] Therefore, interventional educational activities should be directed to lower educated, older people and those with chronic illnesses to effectively improve the knowledge about influenza and its vaccine in our community.

In the present study, participants who had their information about influenza and its vaccination from the community expressed the highest knowledge score whereas those who had their information from family/relatives/friends had the lowest level of knowledge. In Italy,^[18] people who received information about vaccination from physicians expressed a higher level of knowledge about vaccination. Therefore, role of physicians and healthcare workers in education patients in this regards should be encouraged in our community.

In the present study, majority of the participants disagreed with the statement that influenza is a rare disease, while only 30.9% of them considered it as a serious disease and 64.7% considered it preventable disease. In a similar Italian study,^[18] only 17.9% of the people considered influenza as a serious disease.

In the present study, only 15% of the participants perceived worries about developing influenza while 41.2% and 16.2% believed that vaccination is useful in preventing influenza and influenza vaccination is dangerous, respectively. In Italy^[18] Germany^[35] China^[15] and South Africa,^[36] France,^[32] higher rates of people perceived themselves at risk of having influenza, and vaccination is useful in preventing influenza, which might reflect less awareness about the nature of the disease as a highly contagious one among Saudis. However, lower rate of people considered the dangerousness of influenza vaccine than those reported in Italy,^[18] Germany^[35] and France.^[32] which is an encouraging finding.

Believe of the participants regarding effectiveness of the vaccine and risk of getting the infection as well as dangerous effects of the vaccine, all together reflected in the present study by finding that only 32.9% of them were intended to receive seasonal influenza vaccine in the next winter whereas 21.5% of them were not sure about that. In Italy,^[18] 46.9% of the people intended to receive the influenza vaccine next winter. Therefore, improvement of the policy interventions is required to increase intention of those people to be vaccinated against influenza, particularly high-risk group of them.

The present study revealed that the history of receiving a vaccination against influenza in the last season was mentioned by 37.4% of the participants. Slightly higher rate (42.1%) was observed in Italy.^[18] The dramatic finding of this study was that only 42.2% of patients with chronic diseases reported uptaking of the vaccine, which is below the figure reported in Italy (57.9%)^[18], and more important, below the recommended rate (75%).^[26] However, comparable rate (40%) have been reported in most of the WHO European Region countries^[29] and lower rates have been reported in Ireland (29.1%),^[37] France (32.5%)^[32] Bulgaria (30%)^[38] China (18.2%)^[15] Lebanon (27.6%)^[3] South Africa (28.8%)^[36] and Germany (23%).^[35]

In the present survey, the most common reported reasons for not receiving the vaccine were unsure of vaccine effectiveness (22.5%), fear of side effects (16.4%) and fear of needles (13.6%). In another Italian study,^[18] the main reasons were fear of side effects (24.9%), absence of physicians` recommendation (24.2%), felling not being at risk for influenza (18.3%) and concern about usefulness of the vaccine (14%). In Riyadh (2019), concern regarding the side effect and safety of the vaccine was the main barrier of its uptake by the students.^[39] In Bulgaria (2019),^[38] lack of confidence in the vaccine in general (53.7%) was the main reason for being not vaccinated. In China (2018),^[15] the primary reason for being not vaccinated was belief that they were strong enough to not need immunization (42.2%). In South Africa (2017), the commonest reported reasons for not uptake the vaccine were using of alternative protection (51.4%) and believing that vaccine is not necessary because flu is just a minor illness (44.7%).^[36] This apparent discrepancy could be explained by cultural variation and variation in demographics of the participants, however shared reasons were observed.

In the present study, females were more likely than males to uptake seasonal influenza vaccine. Contrary to our finding, In Spain, males were more likely to uptake the vaccine. However, in most studies, no gender difference was observed.^[3, 18, 32, 36, 38]

In the present study both lowest and highest educated participants were more likely to uptake the seasonal influenza vaccine compared to those in between. Finding that higher educated people were more likely to uptake the vaccine was observed in other studies carried out in Lebanon^[3] and China^[15]

Uptaking of seasonal influenza vaccine was significantly associated with better knowledge and positive attitude towards the vaccine. The same has been documented in other studies carried out in Italy^[18, 33], Bulgaria,^[38] United States,^[40] China^[15] South Africa^[36] and France.^[32]

Some potential limitations of the current study should be mentioned. First, the cross-sectional design adopted in the study influences the temporal associations between the independent variables and the outcomes of interest. Second, applying a self-administered tool which is subjected to bias, particularly related to uptake of the vaccine. Finally, we included only patients attending primary healthcare centers, belonging to MOH, which might impact the generalizability of results over the entire general population in Taif. Despite of that, the sample size was sufficient to make the results valid and representative of the entire population.

CONCLUSION:

Knowledge and awareness of adult population in Taif regarding influenza vaccination were good. The most frequently reported sources of awareness about vaccination were healthcare professionals and family/relatives/friends. However, defective knowledge was observed regarding subjects at higher risk of developing severe forms of influenza; particularly children, adolescents and pregnant women. Younger, higher educated, divorced participants, those had their information about vaccination from the community and participants without history of chronic health problems were more knowledgeable.

Attitude towards influenza and its vaccination was overall more negative than positive; particularly regarding seriousness of the disease and usefulness of the vaccine. Saudi nationals, higher educated, participants who had their information about vaccination from the healthcare professionals and non smokers were more likely to express positive attitude towards influenza and its vaccine compared to others.

History of receiving a vaccination against influenza in the last season was far below the recommended rate. Females, lowest and highest educated people, and participants with higher knowledge or attitude were more likely to receive the vaccine than their counterparts.

Based on the study's results, we recommended:

1. Organizing health education activities at primary healthcare centers and public places to improve

the knowledge and attitude of people regarding influenza vaccination

2. Healthcare professionals should play more active role in educating and encouraging patients, particularly those at higher risk for influenza complications to uptake the seasonal influenza vaccine.
3. Implementation of vaccination campaigns, based on proper education to the relieve fears and correct wrong concerns of people
4. Future longitudinal studies including general population are recommended.

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