Medical Science

pISSN 2321–7359; eISSN 2321–7367

Perception and practice of college students regarding seasonal influenza vaccine in central area of Saudi Arabia

Khalid Ahmed Aljasser [1], **Fatima Mohamed Omer Idris**[2], **Rahma Hassan Kutubkhana**[3], **Sara Mahmood AlHosami**[3], **Abdullah Abdulaziz Aleid**[4], **Mohammed Abdulaziz Alkhalifah**[5], **Abdullah Kulip Alonzi**[1], **Anwar Dhawi Almutairi**[6], **Renda Ali Alhabib**[6], **Khalid Ebrahim Alswayed**[1*], **Mahmoud Abdulrahman Mahmoud**[1]

To Cite:
Aljasser KA, Idris FMO, Kutubkhana RH, Al-Hosami SM, Aleid AA, Al-khalifah MA, Alonzi AK, Almutairi AD, Alhabib RA, Alswayed KE, Mahmoud MA. Perception and practice of college students regarding seasonal influenza vaccine in central area of Saudi Arabia. Medical Science 2022; 26: ms504e2492.
doi: https://doi.org/10.54905/disssi/v26i129/ms504e2492

Authors' Affiliation:
[1]College of Medicine, Imam Mohammad IBN Saud Islamic University, Riyadh, Saudi Arabia
[2]Red sea university, Port Sudan, Sudan
[3]Batterjee Medical College, Jeddah, Saudi Arabia
[4]Faculty of Medicine, Taibah University, Medina, Saudi Arabia
[5]King Fahad Medical City, Riyadh, Saudi Arabia
[6]College of Medicine, Qassim University, Buraidah, Saudi Arabia

[*]**Corresponding author**
College of Medicine, Imam Mohammad IBN Saud Islamic University, Riyadh,
Saudi Arabia
Email: Khalid_alswayed@hotmail.com

Peer-Review History
Received: 26 September 2022
Reviewed & Revised: 30/September/2022 to 19/November/2022
Accepted: 23 November 2022
Published: 29 November 2022

Peer-review Method
External peer-review was done through double-blind method.

URL: https://www.discoveryjournals.org/medicalscience

ABSTRACT

Background: Influenza is a very prevalent infection all around the world. This study aimed to determine the knowledge, attitudes, beliefs, barriers and factors influencing influenza (Flu) vaccination uptake among college students in Saudi Arabia's central region. *Methods:* A descriptive cross sectional questionnaire survey was utilized to collect the data from the study participants. *Results:* There were a total of 1,869 valid surveys collected. The younger age group (less than 30 years) dominated the study by a significant margin (61 %). Saudi Arabians comprised more than half of the participants (69 %). Most respondents (62%) worked in healthcare, while 35% did not. Only 35% of the study participants received the vaccine. In comparison, 44% did not 46 % recognized that the influenza vaccine is safe and effective and over half of the participants knew that the seasonal influenza vaccine is freely available at every primary health care. Nearly two-thirds of respondents (n = 592) agreed that the flu-vaccine could cause influenza and around a quarter (n = 490) thought the seasonal influenza vaccine weakens the immune system and makes people more susceptible to disease. *Conclusion:* Vulnerable people who have high risk of getting the influenza flue should be targeted more in regards of health education about the influenza vaccine, multi approach models should be implemented at socio economic factors to increase the tendency for getting the influenza vaccine.

Keywords: Vaccines, influenza virus, perceptions, knowledge, Riyadh, Saudi Arabia.

1. INTRODUCTION

Annually, around 9% of the world's population is estimated to be infected

with influenza, resulting in nearly one billion outbreaks and three to five million deaths (Girard et al., 2005). It can induce a variety of symptoms that vary in severity depending on the virulence of the organism. These symptoms might range from a minor ailment such as breathing difficulties, to a life-threatening condition. High risk groups include children, the elderly, immune compromised people, pregnant women, patients with chronic conditions and healthcare personnel (Abalkhail et al., 2017). Influenza is highly contagious, owing to the fact that it can be transmitted via airborne routes and can quickly spread across vast populations, with reports of pandemic proportions (Abalkhail et al., 2017). The most effective strategy to avoid illness and reduce the health consequences that seasonal influenza might cause is to be vaccinated (Zeitouni et al., 2014).

According to the World Health Organization, high-risk people should be inoculated against influenza. Healthcare employees, for example, can spread of illness from one person to another. Vaccinating healthcare workers has been shown in numerous studies to reduce the risk of influenza transmission and assist limit its spread (Potter et al., 1997; Ghendon et al., 1992). Influenza infection among healthcare professionals is a primary cause of absentee is m and interruption of healthcare services during the winter months when there is an increased need for healthcare assistance (Van et al., 2015). According to a recent study conducted among public and healthcare workers in Saudi Arabia in 2020, only 41.9 % of workers received vaccinations and 24.7 % of them believe that the flu is a minor illness that does not require vaccination (Al Masoud et al., 2020). Seasonal influenza vaccine uptake was estimated to be 55.9% in research conducted among healthcare professionals in Riyadh, Saudi Arabia. These statistics illustrate the importance of understanding the influenza vaccine's preventative value (Alenazi et al., 2018). On the other hand, influenza vaccination might be difficult since it is influenced by people's opinions and understanding.

A number of circumstances and explanations have a part in those who do not get vaccinated (Lino et al., 2011). Another obstacle to getting the influenza vaccine was a desire to avoid drugs and the vaccine's adverse effects, as well as a fear of injections and a previous unpleasant experience with the vaccine (Sagor and Al Ateeq, 2018). Lack of time was also a major reason why healthcare employees did not receive the influenza vaccine (Zaraket et al., 2019). Furthermore, it has been noted that social media have a substantial impact on influenza vaccine awareness (Gargano et al., 2014). Previous research has mostly focused on healthcare practitioners and patients at primary care clinics, ignoring the most crucial segment of the Saudi population; community college students, who make up the majority of the population. As a result, the goal of our research is to assess influenza vaccine awareness and attitudes among college students in Riyadh, Saudi Arabia.

2. SUBJECTS AND METHODS

A Descriptive cross-sectional community-based study was conducted among college students in Saudi Arabia. Between 2020 of June 2021 of July, just before the seasonal influenza vaccination period, a web based, self-enrolled questionnaire was made accessible using the Online Google platform. The questionnaire, which was composed of 38 questions, was designed to elicit information on college students' knowledge, attitudes, beliefs, barriers and factors associated with the uptake of the influenza (flu) vaccine. The questionnaire included multiple choice questions as well as demographic questions regarding the age, sex and marital status of participants.

All the students that participated were informed about the objectives of the study. Participants received the questionnaire with a covering letter explaining the details of the project, the right of the respondent and the confidentiality of the data. Consent obtained from the participants at the beginning of the questionnaire and no personal data disclosing the identity of any of the student's participation was voluntary. Participants who clicked on the link were asked to affirm their agreement to participate in the survey. The obtained data were secured and kept confidential and were used only for research purposes. The target group was particularly medical and non-medical college students in the academic year 2020 of June 2021 of July. The questionnaire was distributed randomly through social media among students to collect the data. The required sample size was measured using the EPI info program, taking into account the CI of 95%, the proportion of 50% and the significance level of 0.05.

Quantitative data were represented as a mean and standard deviation and qualitative data were represented as frequencies and percentages. Descriptive statistics were used throughout the analysis. The significance of associations was tested using Chi square for categorical variables and Student's t test for continuous variables. Data were analyzed using the Statistical Package for Social Science (SPSS) version 21.0 (SPSS, Chicago, IL, USA). P-value < 0.05 was considered to be significant. Ethical approval has been obtained from the regional ethical committees of the Al Qassim region, Saudi Arabia. IRB number: 1443-3-5493

3. RESULTS

Demographic Profile

A total of 1,869 students participated in this survey. By a margin of 61 %, the younger age group (30 years) dominated the survey. More than half of the respondents (57%) were female and more than two-thirds (69%) were Saudi nationals. In terms of educational attainment, 15% had completed high school and 85% had earned a bachelor's degree. Nearly two-thirds of respondents (61%) specialized in the medical sector. Only roughly 35% said they had had the influenza vaccination, despite the fact that 60% had completed the mandatory vaccination regimen (Table 1).

Table 1 The socio demographic characteristics of the participants

Variable	Frequency	Percentage
Age group		
<=30	1116	61%
>30	711	39%
Gender		
Female	1071	57%
Male	754	40%
Nationality		
Non-Saudi	534	29%
Saudi	1290	69%
Education Level		
School	268	15%
University or above	1485	85%
Majoring under the healthcare field		
Yes	1162	62%
No	661	35%
Marital status		
Single	951	51%
Married	762	41%
Widow/ Divorced	113	6%
Financial situation		
Comfortable	819	44%
Manageable	837	45%
Difficult	166	9%
Frequent health checkups		
Yes	858	46%
No	963	52%
Presence chronic disease		
Yes	756	42%
No	1063	58%
Health insurance		
Governmental	682	36%
Private	571	31%
None	567	30%
Smoking		
Yes	608	33%
No	1216	65%
Complete the obligatory vaccination		

schedule		
Yes	1114	60%
No	706	38%
Have you received the flu vaccine?		
Yes	655	35%
No	817	44%
I do not know	345	18%

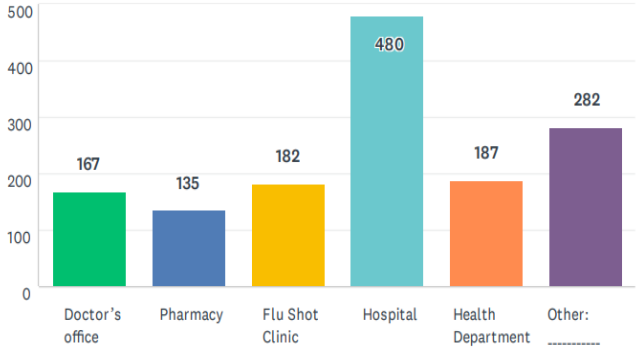

Figure 1 Resources of receiving the influenza vaccine

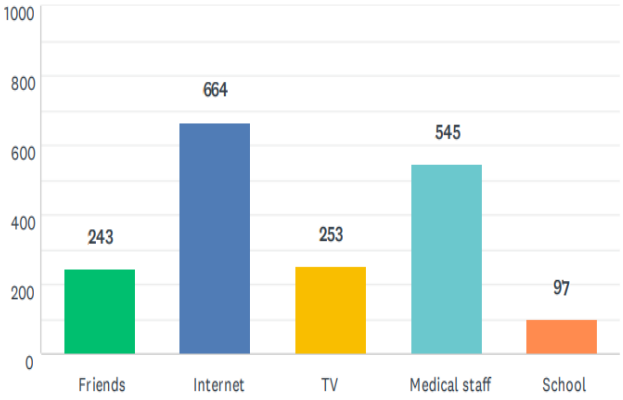

Figure 2 Source of knowledge about the influenza vaccine

Knowledge about flu vaccination

In terms of flu vaccination knowledge, 42% of the respondents agreed that flu infection could be serious enough to require hospitalization. In addition, 46% knew that the influenza vaccine was safe and effective and roughly half of the participants knew that the seasonal influenza vaccine is freely provided in every primary healthcare facility (Figure 1 and 2). Furthermore, nearly two-thirds of the respondents (31.67%) agreed that the flu vaccine could cause influenza.

Relationship between flu vaccination knowledge and demographic profile

A second analysis is conducted to see if awareness of the flu vaccine is affected by respondent characteristics. In this study, the chi square test of independence is used to see if there is a significant relationship between the two nominal variables. The distribution of flu vaccine knowledge per age group is shown in Table 2. The link between respondents' awareness of flu vaccination and age group was also measured using odds ratios (OR). It's worth noting that the odds ratio is calculated without those who chose 'don't know.' For awareness of a flu infection that can be serious enough to require hospitalization, the chances ratio is greater. Younger people (under 30 years) have an 86 % higher chance of agreeing with this knowledge than older people (over 30 years). A significance test using the chi square test reveals that the association is significant because the p-value is less than 0.05 (p =0.001). Other claims, such as safe and effective flu vaccination, a free seasonal flu vaccine and a flu vaccine that can induce influenza, were

also found to be substantially related to participant age, with p-values less than 0.05. Because the p-value was greater than 0.05 (p=0.559), knowledge about seasonal influenza vaccination weakening the immune system and making one prone to infections did not appear to be significantly connected with age group. It is also supported by the calculated odds ratio of 0.96, which is near to 1, indicating that the probability of agreeing with this statement is similar in both age groups.

Table 2 Relationship between age of participants and knowledge of flu vaccination

Knowledge	Age	n	Yes	No	Don't know	OR	Chi square	df	p-value
Flu infection can sometimes be serious that a person must be admitted to the hospital	<=30	1091	48%	28%	24%	1.86	31.809	3	<0.001
	> 30	700	37%	39%	24%				
Influenza vaccine is safe and effective	<=30	1095	50%	18%	32%	1.59	14.055	3	0.003
	> 30	701	43%	24%	33%				
Seasonal influenza vaccine is freely provided in every primary healthcare facility	<=30	1091	54%	14%	32%	1.37	7.872	3	0.049
	> 30	702	49%	18%	34%				
Flu vaccine can cause influenza	<=30	1097	34%	28%	38%	1.40	12.604	3	0.006
	> 30	704	31%	35%	34%				
Seasonal influenza vaccine weakens the immune system and renders one susceptible to infections	<=30	1094	27%	38%	35%	0.96	2.065	3	0.559
	> 30	703	27%	37%	36%				

Table 3 Relationship between level of education and knowledge of flu vaccination

Knowledge	Education	n	Yes	No	Don't Know	OR	Chi square	df	p-value
Flu infection can sometimes be serious that a person must be admitted to the hospital	School	259	51%	26%	23%	1.52	10.501	3	0.015
	University or above	1461	43%	33%	24%				
Influenza vaccine is safe and effective	School	259	49%	22%	29%	0.88	7.850	3	0.049
	University or above	1466	49%	19%	33%				
Seasonal influenza vaccine is freely provided in every primary healthcare facility	School	257	48%	19%	33%	0.66	15.922	3	0.001
	University or above	1466	53%	14%	33%				
Flu vaccine can cause influenza	School	260	31%	30%	39%	0.93	7.046	3	0.070
	University or above	1469	33%	31%	36%				
Seasonal influenza vaccine weakens the immune system and renders one susceptible to infections	School	259	36%	30%	34%	1.80	20.122	3	<0.001
	University or above	1468	26%	39%	36%				

Table 3 shows that flu vaccine knowledge is dependent on the participant's educational level, except for flu vaccination, which can induce influenza since this p-value is not less than 0.05 (p=0.070). The majority of knowledge items were significantly associated with the education level. Furthermore, because all p-values are less than 0.05, specializing in healthcare or non-healthcare has a substantial impact on participants' awareness of the influenza vaccine (Table 4). Because the proportion of individuals who answered "yes" is substantially higher among those who took healthcare professionals, they knew more about flu vaccination knowledge than non-healthcare specializations. However, we must proceed with caution when interpreting these statistically significant results, as they may not reflect practical significance. For "Flu vaccination can induce influenza" and "Seasonal influenza

vaccine impairs the immune system and makes one susceptible to illnesses," the impact size evaluated by the odds ratio is close to one.

Table 4 Relationship between major in healthcare and knowledge of flu vaccination

Knowledge	Major	n	Yes	No	Don't know	OR	Chi square	df	p-value
Flu infection can sometimes be serious that a person must be admitted to the hospital	Healthcare	1146	48%	30%	21%	1.60	990.174	6	<0.001
	Non-healthcare	646	36%	35%	29%				
Influenza vaccine is safe and effective	Healthcare	1144	55%	19%	26%	1.82	1100.155	6	<0.001
	Non-healthcare	652	34%	22%	44%				
Seasonal influenza vaccine is freely provided in every primary healthcare facility	Healthcare	1143	59%	15%	25%	1.61	1086.821	6	<0.001
	Non-healthcare	651	38%	16%	47%				
Flu vaccine can cause influenza	Healthcare	1148	38%	34%	28%	1.09	1161.007	6	<0.001
	Non-healthcare	653	25%	24%	51%				
Seasonal influenza vaccine weakens the immune system and renders one susceptible to infections	Healthcare	1145	30%	43%	26%	0.83	1115.630	6	<0.001
	Non-healthcare	652	22%	27%	51%				

The relationship between influenza vaccine knowledge and how often people get their health checked, whether they have completed all required vaccinations and whether they have received a flu vaccination was shown in Tables 5, 6 and 7 respectively. The Chi-square tests yield significant findings (p-value <0.05), implying that respondent knowledge of influenza vaccination is influenced by the health/vaccination status of the participants. When compared to those who have never gotten a flu vaccine, individuals who have received flu vaccination have more than twice the odds of knowing the safety and effectiveness of influenza vaccination. Despite the statistical significance of the findings, practical significance should be examined because numerous estimated odds ratios are near one, indicating that there may be no practical impact.

Table 5 Relationship between frequent health checkups and knowledge of flu vaccination

Knowledge	Frequent Health Checkups	n	Yes	No	Don't know	OR	Chi square	df	p-value
Flu infection can sometimes be serious that a person must be admitted to the hospital	Yes	845	41%	34%	25%	0.78	969.169	6	<0.001
	No	946	46%	30%	24%				
Influenza vaccine is safe and effective	Yes	850	44%	24%	32%	0.61	1040.162	6	<0.001
	No	945	50%	17%	33%				
Seasonal influenza vaccine is freely provided in every primary healthcare facility	Yes	848	50%	18%	32%	0.75	998.107	6	<0.001
	No	945	53%	14%	34%				
Flu vaccine can cause influenza	Yes	851	34%	31%	35%	1.02	1072.493	6	<0.001
	No	949	32%	30%	38%				
Seasonal influenza vaccine weakens the immune system and renders one susceptible to infections	Yes	851	34%	32%	34%	2.14	1049.304	6	<0.001
	No	945	21%	42%	37%				

Table 6 Relationship between complete obligatory vaccination and knowledge of flu vaccination

Knowledge	Complete Obligatory Vaccination	n	Yes	No	Don't know	OR	Chi square	df	p-value
Flu infection can sometimes be serious that a person must be admitted to the hospital	Yes	1100	43%	32%	25%	0.98	944.908	6	<0.001
	No	690	44%	32%	23%				
Influenza vaccine is safe and effective	Yes	1102	51%	15%	34%	2.38	1051.749	6	<0.001
	No	692	41%	28%	30%				
Seasonal influenza vaccine is freely provided in every primary healthcare facility	Yes	1099	56%	12%	32%	2.35	1011.454	6	<0.001
	No	693	44%	22%	34%				
Flu vaccine can cause influenza	Yes	1105	32%	30%	39%	0.99	1054.986	6	<0.001
	No	694	35%	32%	33%				
Seasonal influenza vaccine weakens the immune system and renders one susceptible to infections	Yes	1102	22%	41%	36%	0.48	1021.236	6	<0.001
	No	693	35%	31%	34%				

Table 7 Relationship between receiving flu vaccination and knowledge of flu vaccination

Knowledge	Receiving Flu Vaccination	n	Yes	No	Don't know	OR	Chi-square	df	p-value
Flu infection can sometimes be serious that a person must be admitted to the hospital	Yes	654	37%	41%	23%	0.40	1018.559	9	<0.001
	No	801	54%	24%	21%				
	Don't know	333	33%	34%	33%				
Influenza vaccine is safe and effective	Yes	653	60%	12%	28%	2.57	1146.58	9	<0.001
	No	802	46%	23%	32%				
	Don't know	338	27%	30%	43%				
Seasonal influenza vaccine is freely provided in every primary healthcare facility	Yes	653	56%	11%	33%	1.44	1080.214	9	<0.001
	No	802	55%	15%	30%				
	Don't know	336	33%	26%	40%				
Flu vaccine can cause influenza	Yes	654	27%	37%	36%	0.48	1075.17	9	<0.001
	No	806	39%	26%	35%				
	Don't know	337	29%	29%	42%				
Seasonal influenza vaccine weakens the immune system and renders one susceptible to infections	Yes	651	18%	45%	37%	0.43	1078.811	9	<0.001
	No	805	32%	35%	33%				
	Don't know	338	35%	27%	38%				

4. DISCUSSION

The purpose of the study was to determine the rate of influenza vaccination uptake among college students, as well as the knowledge, attitudes, beliefs and factors that influence influenza vaccines in Riyadh region Saudi Arabia. Given that our respondents were drawn from a general population of public colleges, students of various socio demographic characteristics (age, gender, maternal status and so on) were asked to examine influenza vaccination uptake awareness. The seasonal influenza vaccine has been administered to a comparatively high percentage (46%) of the participants in this study. Our results are similar with those reported in Europe and Saudi Arabia (Mereckiene et al., 2012; Almotairy et al., 2019; Alqahtani et al., 2017). Inoculation rates in the general Saudi population ranged from 15 to 44.53 % in healthy adults, 17.8 % among military members and 18.1 % among pregnant patients (Sagor and Al Ateeq, 2018.) while a Jordanian study found no significant links between age and vaccines. Furthermore, it is obvious that people with a greater degree of education are more likely to get vaccinated, as demonstrated by Almotairy et al., (2019)

who found that those with a university education were more likely to be vaccinated than those with a school education (P = 0.001). Higher education, on the other hand, has been recognized as a possible barrier to immunization in the United States, China, Lebanon, Bangladesh and Israel (Sinno et al., 2009; Rahman and Obaida-Nasrin, 2010; Muhsen et al., 2012), as well as in Jordan. However, our research found no statistically significant relationship between educational degrees and vaccination rates.

The assumption that the seasonal influenza vaccine can cause influenza, weaken the immune system and make people more susceptible to infections was the most often reported barrier to people taking the vaccine (Almotairy et al., 2019). Beliefs that the vaccine is ineffective and/or dangerous were also mentioned as hurdles. The majority of participants in the Makkah study believe that the seasonal influenza vaccine is hazardous and are concerned about possible negative effects (Korani et al., 2015).

The most common reasons for vaccine refusal in another study among parents, adult patients and healthcare workers were doubts about the vaccine's efficacy, the assumption that a healthy lifestyle alone prevents influenza and other concerns about possible catastrophic side effects (Abalkhail et al., 2018). Among healthcare personnel (Awaidy et al., 2018) discovered additional constraints such as a lack of conviction and logistical difficulties (e.g., equipment, time consumption and infrastructure) (Sales et al., 2021). However, a sizable percentage of people (19-31%) are still uninformed about the flu vaccine. This barrier can be readily overcome if family medicine physicians and primary healthcare facilities raise awareness during influenza season. Vaccines, for example, may be made available in the screening room, with nurses offering them to any present patient or relative (after ensuring no contraindication).

The cross-sectional design of this study hampered its ability to establish causality between study variables. In conclusion, this study found that college students in Riyadh, Saudi Arabia, have a low understanding and attitudes towards influenza vaccination. It also revealed knowledge gaps and key impediments to using the influenza vaccine. These findings imply that we should develop educational programs and raise awareness among the general public, especially along with those who are at higher risk of severe influenza complications, in order to improve their knowledge of the influenza vaccine and so obtain higher vaccination rates. Finally, understanding of influenza vaccination is still low among Saudi Arabian college students, with roughly one-third of them unaware of the vaccine.

5. CONCLUSION

Minority groups should receive more emphasis in health education to improve their grasp of fundamental information about influenza and vaccine. In addition to individual behavioral modifications, social and structural variables should be examined to improve influenza vaccine uptake.

Acknowledgement

We thank the participants who were all contributed samples to the study

Author Contributions

All authors have been contributed to this project equally

Ethical approval

Has been obtained from the regional ethical committees of the Alqassim region, Saudi Arabia IRB number: 1443-3-5493

Funding

This study has not received any external funding.

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. Abalkhail MS, Alzahrany MS, Alghamdi KA, Alsoliman MA, Alzahrani MA, Almosned BS, Gosadi IM, Tharkar S. Uptake of influenza vaccination, awareness and its associated barriers among medical students of a University

Hospital in Central Saudi Arabia. J Infect Public Health 2017; 10(5):644-648. doi: 10.1016/j.jiph.2017.05.001

2. Abalkhail MS, Alzahrany MS, Alghamdi KA, Alsoliman MA, Alzahrani MA, Almosned BS, Gosadi IM, Tharkar S. Uptake of influenza vaccination, awareness and its associated barriers among medical students of a University Hospital in Central Saudi Arabia. J Infect Public Health 2017; 10:644–648.
3. Al Awaidy, Althaqafi, Dbaibo. A Snapshot of Influenza Surveillance, Vaccine Recommendations and Vaccine Access, Drivers and Barriers in Selected Middle Eastern and North African Countries. Oman Med J 2018; 33:283–290.
4. Al-Masoud FS, Al-Qahtani SS, Alshaqaqiq AM, Al-Ghwainem NI, Alkadhem KTA, Alsultan MM, AlEid NF, Altaweel GR, Saad NOB, Al-Thkerallah FA. Awareness and attitude regarding influenza vaccine among public and health care providers in the eastern region of Saudi Arabia. Int J Med Developing Countries 2020; 4(4):793–799. https://doi.org/10.24911/IJMDC.51-1578900408.
5. Alenazi BR, Hammad SM, Mohamed AE. Prevalence of seasonal influenza vaccination among primary healthcare 2018.
6. Alqahtani AS, Althobaity HM, Al-Aboud D, Abdel-Moneim AS. Knowledge and attitudes of Saudi populations regarding seasonal influenza vaccination. J Infect Public Health 2017; 10:897-900.
7. Gargano LM, Underwood NL, Sales JM, Seib K, Morfaw C, Murray D, DiClemente RJ, Hughes JM. Influence of sources of information about influenza vaccine on parental attitudes and adolescent vaccine receipt. Hum Vaccin Immunother 2015; 11:1641–1647.
8. Ghendon Y. Influenza its impact and control. World Health Stat Q 1992; 45:306–11.
9. Girard MP, Cherian T, Pervikov Y, Kieny MP. A review of vaccine research and development: Human acute respiratory infections. Vaccine 2005; 23:5708–24.
10. Lino M, Giuseppe GD, Albano L, Angelillo IF. Parental knowledge, attitudes and behaviours towards influenza A/H1N1 in Italy. Eur J Public Health 2011; 22:56872.
11. Muhsen K, El-Hai RA, Amit-Aharon A, Nehama H, Gondia M, Davidovitch N, Goren S, Cohen D. Risk factors of underutilization of childhood immunizations in ultraorthodox Jewish communities in Israel despite high access to health care services. Vaccine 2012; 30:2109–2115.
12. Potter J, Stott DJ, Roberts MA. Influenza vaccination of healthcare workers in long-term-care hospitals reduces the mortality of elderly patients. J Infect Dis 1997; 175:1–6.
13. Rahman M, Obaida-Nasrin S. Factors affecting acceptance of complete immunization coverage of children under five years in rural Bangladesh. Salud Publica Meexico 2010; 52: 134–140.
14. Sagor KH, AlAteeq MA. Beliefs, attitudes and barriers associated with the uptake of the seasonal influenza vaccine among patients visiting primary healthcare clinics. Saudi Med J 2018; 39(7):690-696. doi: 10.15537/smj.2018.7.22293
15. Sinno DD, Shoaib H, Musharrafieh UM, Hamadeh GN. Prevalence and predictors of immunization in a health insurance plan in a developing country. Pediatr Int 2009; 51: 520–525.
16. Van Buynder PG, Konrad S, Kersteins F. Healthcare worker influenza immunization vaccinates or mask policy: Strategies for cost effective implementation and subsequent reductions in staff absenteeism due to illness. Vaccine 2015; 33:1625–8.
17. World Health Organization. Global Influenza Programme. A manual for estimating disease burden associated with seasonal influenza 2015. http://www.who.int/influenza/resources/publications/manual_ burden_of_disease/en/
18. Zaraket H, Melhem N, Malik M, Khan WM, Dbaibo G, Abubakar A. Review of seasonal influenza vaccination in the Eastern Mediterranean Region: Policies, use and barriers. J Infect Public Health 2019; 12:472-8.
19. Zeitouni MO, Al Barrak AM, Al-Moamary MS, Alharbi NS, Idrees MM, Al-Shimemeri AA. The Saudi Thoracic Society guidelines for Influenza vaccinations. Ann Thorac Med 201 5; 10:223-230.