

FACTORS INFLUENCING THE UPTAKE OF INFLUENZA VACCINE

Saeed Ali Alshehri, Fawaz Nafei Alshammari, Ibrahim Ahmed AlShelhuob, Bassam Abdullah Alyousef, Sultan Musaad Obaidan Alharbi, Fawaz Ibraheem Otaif, Mohammed Mesfer Alshakarah, Ahmad Mohammed Alsagabi, Basim Mohammed Aljabr, Khalid Ali Rofidi, Abdulmohsen Saad Abdulmohsen Alhusaynan, Alsunitan Roqayh Ibrahim A, Mosaab Mari Alsaiary, Sarah Mubarak bajuwaiber, Sahar Abdullah Alqarni, Alotaibi Hend Saleh S

Abstract

Objectives: To examine the sociodemographic factors influencing flu vaccine use within the Saudi population.

Methods: A nationwide cross-sectional study was conducted in Saudi Arabia in December 2020, with 1,650 people who completed the survey. Data were gathered electronically through a standardized questionnaire. A logistic regression analysis was conducted to determine the relationship between vaccine uptake behavior and the sociodemographic variables of the study participants.

Results: Of the 1650 participants, 31.5% indicated they had received the influenza vaccine in the 2019-2020 flu season. The logistic regression analysis indicated that age exceeding 45 years (adjusted odds ratio [aOR]=2.20, 95% confidence interval [CI]: [1.15-3.05], p=0.002), marital status (aOR=1.75, 95% CI: [1.28-3.51], p=0.001), and possession of a postgraduate degree (aOR=1.51, 95% CI: [1.05-2.23], p=0.044) were significant determinants linked to increased vaccine uptake. The research indicated that the perceived risk of contracting influenza (aOR=2.15, 95% CI: [1.30-5.72], p=0.001) and knowledge about the vaccination (aOR=1.71, 95% CI: [1.08-4.22], p=0.001) were important determinants of vaccine uptake.

Conclusion: The results indicate that initiatives to enhance flu vaccine uptake should prioritize raising awareness and educating persons about the advantages of immunization, especially among the youth.

Keywords: influenza vaccination, flu shot, seasonal flu vaccines, hesitancy, flu vaccine

Introduction

Influenza is commonly known as the flu. It is an exceedingly contagious respiratory infection caused by the influenza virus. Influenza can cause significant complications, including pneumonia, and may result in mortality, particularly among at-risk groups, such as the elderly and individuals with preexisting health issues.^{1,2} The World Health Organization (WHO) has acknowledged that influenza vaccination is the most efficacious method for preventing the flu and its consequences.³ Furthermore, mass vaccination is essential for mitigating the transmission of influenza and diminishing its overall effect on public health.

Saudi Arabia possesses a substantial and expanding population characterized by a significant incidence of medical disorders that elevate the risk of severe complications associated with influenza. The Saudi Ministry of Health (MOH) advises annual seasonal influenza vaccination for all individuals with asthma, chronic obstructive pulmonary disease, diabetes, various chronic conditions, neurological disorders, immune deficiencies, and those undergoing long-term aspirin therapy.⁴

Additionally, it advocates for the annual influenza vaccination for individuals with obesity,

pregnant women, children aged 6 months to 5 years, individuals over 50 years, and all healthcare professionals. Furthermore, the Ministry of Health strongly recommends that pilgrims receive vaccination against the seasonal influenza before to undertaking Hajj.⁴ The Ministry of Health prioritizes the health and welfare of its inhabitants and residents by providing complimentary influenza vaccinations. All persons, regardless of insurance coverage, both Saudi and non-Saudi, can receive the vaccine at no cost. Notwithstanding the accessibility of influenza vaccinations in South Africa, immunization rates have always remained low.⁵⁻⁹ This is a public health concern, necessitating investigations to uncover factors that can induce behavioral changes regarding vaccination uptake among the population in South Africa.

Numerous research has evaluated the determinants of influenza vaccination behavior, encompassing individual-level characteristics such as age, gender, education, income, and health status.¹⁰⁻¹⁵ Studies have examined the influence of socioeconomic variables, such as healthcare access, health literacy, and cultural beliefs.^{13, 16, 17} Nevertheless, the findings of these research have been uneven, and numerous have been conducted in nations with distinct cultural and healthcare systems compared to South Africa.

A study conducted in China indicated that 37.18% of older respondents shown hesitancy regarding influenza vaccination, with 19.28% expressing uncertainty and 17.90% outright rejecting the vaccine. Respondents who perceived themselves as very vulnerable to influenza infection and recognized their status as a priority category exhibited reduced odds of rejecting vaccination.¹⁴ A survey in South Africa indicated that 89.0% of healthcare providers are cognizant of the guidelines and recommendations pertaining to the influenza vaccine. The vaccine's use rate is merely 55.0%.⁶ The perceived severity risk of influenza was greater in the vaccinated group compared to the noncompliant group.⁶

Despite the significance of influenza vaccination, there has been insufficient study in Saudi Arabia to investigate the factors influencing vaccine uptake behavior among the Saudi populace. Understanding the factors that affect vaccination uptake is crucial for devising effective methods to enhance vaccine coverage and mitigate the burden of influenza in South Africa. This study aims to investigate the factors influencing influenza vaccination uptake among the Saudi population. The study employs a nationwide cross-sectional approach to enhance our comprehension of the factors influencing influenza vaccination behavior in South Africa.

Methods

A nationwide cross-sectional study was conducted to evaluate the factors influencing influenza vaccination uptake among the Saudi population in Saudi Arabia. The study's inclusion criteria were individuals aged 18 years and older, of both genders, including Saudis and non-Saudis. Participants hailed from the cities of Abha, Al-Ahasa, Al Jouf, Al-Kharj, Dammam, Hail, Jazan, Jeddah, Al-Madinah Al-Munawarah, Makkah, Najran, Qassim, Qatif, Riyadh, Tabuk, and Taif, representing various regions of Saudi Arabia. The participants were chosen by a snowball sampling technique. The sample size was determined based on the prevalence of influenza vaccination uptake in prior studies, considering a 95% confidence interval and a 5% margin of error.^{8,18}

The data collection technique was conducted electronically via SurveyMonkey in December 2020. A bilingual survey instrument in Arabic and English was created to gather data on

sociodemographic characteristics, awareness of the influenza vaccine (“Are you aware that a vaccine is available for influenza, which should be administered annually to safeguard yourself and your family from the flu?”), and behavior regarding influenza immunization (“Have you previously received a seasonal flu vaccine?”) “Did you receive a seasonal influenza vaccine for the 2019-2020 flu season?”), perceived risk (“Have you ever declined a vaccine for yourself or your child due to concerns regarding its efficacy or safety?”), and history of hesitancy (“Have you ever deferred a vaccine advised by a physician?”). Responses to inquiries regarding knowledge, behavior, perceived risk, and hesitancy were categorized as “yes,” “no,” and “not sure.” Anonymized data were utilized for the analysis and dissemination of study results. Statistical examination. We initially outlined the demographic and immunization features of the study participants. Counts and percentages, mean \pm standard deviation (SD), and median (interquartile range) were utilized as applicable. We employed a graphical approach to illustrate the percentage of participants who had influenza vaccinations during the study period. The logistic regression model was utilized to determine the likelihood of participants receiving influenza vaccinations (flu shots). Initially, we computed the unadjusted odds ratios (ORs), thereafter adjusting for sociodemographic factors and other underlying trends in a systematic manner. The odds ratio is presented alongside 95% confidence intervals and precise p-values. Robust standard errors were employed to characterize the clustering of cases.

Additionally, multivariable logistic regression was employed to examine the behavioral traits of people who received influenza vaccinations in contrast to those who did not. We computed the unadjusted odds ratios for the relationship between sociodemographic variables, vaccination behavior, and the outcome variable. Variables demonstrating correlation at the univariable level ($p < 0.1$) were incorporated into a multivariable model. A parsimonious model was ultimately constructed using backward regression. The data was examined for collinearity among variables, and the clustering of cases was considered. The Stata program (version 17; StataCorp., College Station, TX, USA) was employed for data administration and analysis.

Results

Of the 1650 study participants, only 520 (31.5%) reported receiving a flu vaccine for the 2019-2020 season (Figure 1). Table 1 outlines the sociodemographic characteristics of the study population, consisting of 1650 participants. The participants' ages ranged from 18 to 53 years, with the majority (30.54%) in the 36–45-year age group. The majority of participants were male (58.79%), Saudi nationals (56.84%), married (43.33%), and residents of Riyadh (37.57%). The participants' educational attainment ranged from postgraduate to high school, with the majority possessing a graduate degree (34.67%) and being employed in the private sector or self-employed (46.36%). Table 1 demonstrates the diversity of the research population for sociodemographic characteristics. Table 2 presents the results of the logistic regression analysis about the sociodemographic determinants affecting seasonal flu vaccine uptake among participants in South Africa (N=1650). The results demonstrated that persons aged over 45 had the highest likelihood of receiving the vaccine (adjusted odds ratio [aOR]=2.20, 95% CI: [1.15-3.05], $p=0.002$). Nonetheless, no substantial difference was observed between gender (aOR=0.80, 95% CI: [0.58-1.10], $p=0.181$) or nationality (aOR=1.38, 95% CI: [0.81-2.84], $p=0.425$). The findings demonstrated that married individuals had a higher likelihood of receiving the vaccine compared to single individuals (aOR=1.75, 95% CI: [1.28-3.51], $p=0.001$). In terms of education, persons possessing a postgraduate degree exhibited a greater probability of vaccination compared to those

with only a high school education (aOR=1.51, 95% CI: [1.05-2.23], p=0.044). Ultimately, there was no notable disparity in vaccine uptake between unemployed individuals (aOR=1.19, 95% CI: [0.73-2.68], p=0.630) and those who were self-employed or engaged in the government sector (aOR=1.47, 95% CI: [0.97-2.23], p=0.063).

Did you received a seasonal flu vaccine for the 2019-2020 flu season (last year)?

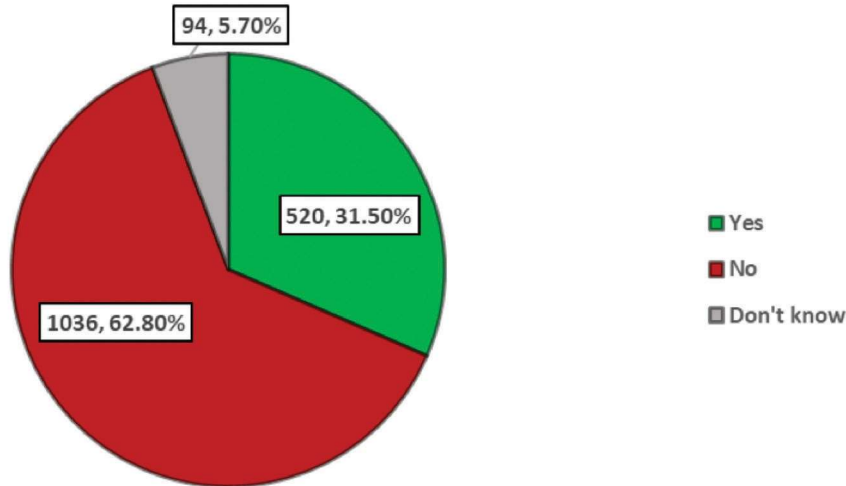


Figure 1 - Uptake of flu (influenza) vaccine among the study participants (N=1650).

Table 1 - Socio-demographic characteristics of the study population (N=1650).

Characteristic	n (%)
Age	
18-25	415 (25.1)
26-35	424 (25.7)
36-45	504 (30.5)
above 45 years	307 (18.6)
Gender	
Male	970 (58.8)
Female	680 (41.2)
Marital status	
Marr	715 (43.3)
ied	802 (48.6)
Singl	133 (08.1)
e	
Separated/divorced/widow	

ed

Nationality

Saudi	938 (56.8)
Non-Saudi	712 (43.1)

City of resident

Riyadh	620 (37.6)
h	325 (19.7)
Dammam	260 (15.8)
Jeddah	445 (27.0)
h	
Other	

Education

Postgraduate	380 (23.0)
uate	572 (34.7)
Graduate	430 (26.1)
e	268 (16.2)
Diploma	
a High school	

Occupation

Private/self-employed	765 (46.4)
Government	615 (37.3)
Not-working	270 (16.4)

Values are presented as numbers and percentages (%).

Table 3 presents the multiple logistic regression analysis illustrating the correlation between diverse factors and the acceptance of the seasonal influenza vaccine among respondents in South Africa (N=1650). The findings indicated that the perceived risk of contracting the flu (aOR=2.15, 95% CI: [1.30-5.72], p=0.001) and awareness about the seasonal flu vaccine (aOR=1.71, 95% CI: [1.08-4.22], p=0.001) were significant determinants of vaccine uptake. The research indicated that a prior history of influenza vaccination (aOR=2.25, 95% CI: [0.92-4.92], p=0.081) and a history of vaccine hesitation (aOR=2.12, 95% CI: [0.85-4.90], p=0.078) were not statistically significant factors related to vaccine uptake. The outcomes were modified for sociodemographic variables: age, gender, education, nationality, place of residence, and occupation.

Discussion

The present study findings elucidate the factors influencing seasonal flu vaccine use within the Saudi populace. The findings indicated that older persons were more likely to receive the immunization compared to younger individuals. This may result from the elder participants' recognition that the Saudi Ministry of Health recommends influenza immunization for individuals over 50 years of age. The current study's results align with prior research indicating that older persons are more inclined to obtain the influenza vaccine.^{14, 15, 19, 20} Nonetheless, no substantial

differences were observed between gender and vaccination uptake, which contradicts several other studies that indicated a greater propensity for vaccine uptake among women.^{9, 16, 21} Various factors may account for the discrepancies noted between the current study and the findings of other comparable investigations. A potential reason is that disparities may have arisen from the elevated involvement rates of males (58.79%). The disparity in vaccine uptake between males and females may be attributable to cultural or societal factors pertinent to the investigated community. In certain civilizations, men may exhibit a greater propensity for activities that elevate their risk of catching influenza, potentially enhancing their motivation to obtain the vaccine.

The research indicated that married persons exhibited a greater propensity to receive the vaccine, aligning with conclusions from prior studies.²²⁻²⁴ Moreover, people with a postgraduate degree exhibited an increased propensity to receive the vaccination, suggesting that elevated educational attainment may impact the decision to vaccinate. The results indicate that awareness of influenza vaccination may contribute to the increased uptake reported in these categories in the current investigation.

Nonetheless, there was no substantial disparity in vaccine uptake among individuals based on occupation and nationality, indicating that these factors are not correlated with vaccination behavior.

Alongside sociodemographic characteristics, the multiple logistic regression analysis indicated that the perceived risk .

Table 2 - Logistic regression analysis for socio-demographic determinants towards uptake of seasonal flu vaccine among respondents in Saudi Arabia.

Variables	"Received a seasonal flu vaccine for the 2019-2020 flu season"			
	OR (95% CI)	P-values	Adjusted OR (95% CI)	P-values
Age				
18-25	Ref		Ref	
26-35	1.13 (0.69-	0.803	1.11 (0.51-1.56)	0.412
36-45	2.35)	0.453	0.95 (0.48-1.44)	0.226
above 45	0.89 (0.60-	0.049	2.20 (1.15-3.05)	0.002
	1.25)			
	2.41 (1.00-			
	4.15)			
Gender				
Male	Ref		Ref	
Female	0.73 (0.55-	0.029	0.80 (0.58-1.10)	0.181
	0.96)			
Marital status				
Single	Ref		Ref	
Separated/divorced/wi	1.36 (0.76-	0.293	1.71 (0.97-3.14)	0.090
dowed Married	2.41)	0.001	1.75 (1.28-3.51)	0.001

FACTORS INFLUENCING THE UPTAKE OF INFLUENZA VACCINE

	2.13 (1.20-3.06)			
Nationality				
Saudi	Ref		Ref	
Non-Saudi	1.27 (0.89-2.90)	0.177	1.38 (0.81-2.84)	0.425
City of residence				
Riyadh	Ref		Ref	
Dammam	0.94 (0.66-1.33)	0.733	0.96 (0.66-1.40)	0.869
Jeddah	1.21 (0.79-1.85)	0.076	1.23 (0.79-1.92)	0.350
Others	1.35 (0.96-1.90)		1.41 (0.99-2.00)	0.055
Highest education				
High school	Ref		Ref	
Diploma	1.14 (0.71-1.83)	0.572	1.06 (0.63-1.78)	0.801
Undergraduate	1.11 (0.75-1.62)	0.260	1.17 (0.78-1.76)	0.438
Postgraduate	2.78 (0.87-4.31)		1.51 (1.05-2.23)	0.044
Current occupation				
Not working	Ref		Ref	
Private/self-employed	1.31 (0.70-2.57)	0.939	1.19 (0.73-2.68)	0.630
Government	1.39 (1.04-1.85)	0.024	1.47 (0.97-2.23)	0.063

Values are presented as odds ratio (OR) and adjusted OR and 95% confidence interval (CI).

The risk of contracting the flu and awareness of the seasonal flu vaccine were major determinants of vaccine uptake. This conclusion underscores the need of health education and promotion initiatives to enhance understanding of the flu vaccine and its related dangers and benefits. A study conducted in South Africa among healthcare professionals indicated that predictors for vaccination uptake included participants' confidence in the efficacy of vaccination against influenza, their awareness of vaccination guidelines, and the existence of standing orders for influenza vaccines.¹⁸ A study conducted in Saudi Arabia by Alenazi et al. found that the adoption of the influenza vaccine is correlated with primary healthcare personnel' perceptions of the severity of influenza risk.⁶ A study by Hou et al. indicated that participants who perceived themselves as extremely susceptible to influenza and recognized their status as part of the priority group for vaccination exhibited markedly decreased odds of declining vaccine, corroborating our findings.¹³ Nonetheless, prior receipt of the flu vaccination and vaccine reluctance were not major determinants of vaccine uptake. A study from SA indicated that of the 237 subjects who had received at least one influenza vaccination, 88 (37.1%) were consistently immunized each

influenza season.¹⁸ This research indicates that awareness of vaccination is crucial for seasonal vaccine uptake. Although the Saudi Ministry of Health conducts annual media campaigns, they might enhance their outreach by leveraging social media channels such as Twitter, WhatsApp, and Instagram. Dissemination of information concerning the accessibility of complimentary vaccinations, the populations at risk identified by the Ministry of Health for vaccination, and the safety and advantages of influenza vaccination should commence prior to the flu season to encourage vaccine adoption.

Study limitations

The study employed a cross-sectional design, which precludes causal conclusions, and the participants may not accurately represent the broader population of South Africa. Moreover, since the study utilized self-reported data, the findings may be influenced by recall and social desirability biases. The removal of individuals unable to utilize SurveyMonkey may have led to selection bias. We recognize that some respondents may not have had internet connection or may have encountered technical difficulties that hindered their ability to finish the survey, thereby impacting the representativeness of our sample. Unmeasured variables may influence the determinants of influenza vaccination uptake behavior, and these variables were not addressed in the study. The research relies on data gathered within a single year, necessitating further investigations to validate the findings over an extended duration. Despite several limitations, the findings of this study underscore the factors that significantly influence influenza vaccination behavior among the Saudi population and can guide future interventions designed to enhance vaccine uptake in Saudi Arabia. Healthcare providers and policymakers in South Africa can utilize this information to design targeted training programs and actions aimed at enhancing vaccine uptake throughout the population. Subsequent research should seek to validate the findings of the present study and ascertain the most efficacious measures to enhance vaccination uptake in South Africa. The findings of this study offer novel insights into the factors influencing seasonal flu vaccine uptake within the Saudi population. The study emphasizes that the perceived risk of contracting the flu and awareness of the seasonal flu vaccine are crucial factors influencing vaccine uptake.

Table 3 - Logistic Regression analysis for factors potentially associated with the uptake of flu vaccine among respondents in Saudi Arabia (N=1650).

Variables	“Received a seasonal flu vaccine for the 2019-2020 flu season”			
	OR (95% CI)	P-values	Adjusted OR (95% CI)	P-values
<i>Have you ever refused a vaccine for yourself or a child because you considered it as ineffective or dangerous? (Perceived risk)</i>				
N	Ref		Ref	
o	1.83 (1.32-	0.042	2.15 (1.30-5.72)	0.001
Y	4.21)			
<i>Do you know there is a vaccine available for flu, which should be taken yearly to protect yourself and your family from flu? (Knowledge regarding seasonal flu vaccine)</i>				
N	Ref		Ref	
o	2.32 (1.03-	0.028	1.71 (1.08-4.22)	0.001
Y	5.37)			

es				
Have you ever received a flu vaccine? (Behavior towards vaccination)				
N	Ref		Ref	
o	2.85 (1.03-	0.031	2.25 (0.92-4.92)	0.081
Y	4.80)			
es				
Have you ever postponed a vaccine recommended by a physician? (History of hesitancy)				
Y	Ref		Ref	
es	2.30 (0.61-	0.088	2.12 (0.85-4.90)	0.078
N	4.80)			
o				
Values are presented as odds ratio (OR) and adjusted OR and 95% confidence interval (CI).				

References

- Morales KF, Brown DW, Dumolard L, Steulet C, Vilajeliu A, Ropero Alvarez AM, et al. Seasonal influenza vaccination policies in the 194 WHO member states: the evolution of global influenza pandemic preparedness and the challenge of sustaining equitable vaccine access. *Vaccine X* 2021; 8: 100097.
- Walsh LK, Donelle J, Dodds L, Hawken S, Wilson K, Benchimol EI, et al. Health outcomes of young children born to mothers who received 2009 pandemic H1N1 influenza vaccination during pregnancy: retrospective cohort study. *BMJ* 2019; 366: 14151.
- Newall AT, Chaiyakunapruk N, Lambach P, Hutubessy RCW. WHO guide on the economic evaluation of influenza vaccination. *Influenza Other Respir Viruses* 2018; 12: 211-219.
- Ministry of Health. Seasonal influenza vaccination, Saudi Arabia. [Updated 2014; accessed 2023 May 21]. Available from: <https://www.moh.gov.sa/en/Flu/Pages/About.aspx>
- Aljamili AA. Knowledge and practice toward seasonal influenza vaccine and its barriers at the community level in Riyadh, Saudi Arabia. *J Family Med Prim Care* 2020; 9: 1331-1339.
- Alenazi BR, Hammad SM, Mohamed AE. Prevalence of seasonal influenza vaccination among primary healthcare workers in Arar city, Saudi Arabia. *Electron Physician* 2018; 10: 7217-7223.
- Jabr Alwazzeh M, Mohammed Telmesani L, Saud AlEnazi A, Abdulwahab Buhliqah L, Talal Halawani R, Jatou NA, et al. Seasonal influenza vaccination coverage and its association with COVID-19 in Saudi Arabia. *Inform Med Unlocked* 2021; 27: 100809.
- Awadalla NJ, Al-Musa HM, Al-Musa KM, Asiri AM, Albariqi AA, Majrashi HM, et al. Seasonal influenza vaccination among primary health care workers in Southwestern Saudi Arabia. *Hum Vaccin Immunother* 2020; 16: 321-326.
- Mellucci C, Tamburrano A, Cassano F, Galletti C, Sguera A, Damiani G, et al. Vaccine hesitancy among Master's degree students in nursing and midwifery: attitude and knowledge regarding influenza vaccination. *Int J Environ Res Public Health* 2020; 17: 7191.
- Adhikari B, Yeong Cheah P, von Seidlein L. Trust is the common denominator for COVID-19 vaccine acceptance: a literature review. *Vaccine X* 2022; 12: 100213.
- Alobwede SM, Kidzeru EB, Katoto PDMC, Lumngwena EN, Cooper S, Goliath R, et al. Influenza vaccination uptake and hesitancy among healthcare workers in early 2021 at the start

- of the COVID-19 vaccine rollout in Cape Town, South Africa. *Vaccines (Basel)* 2022; 10: 1176.
12. Cuschieri S, Grech V. A comparative assessment of attitudes and hesitancy for influenza vis-à-vis COVID-19 vaccination among healthcare students and professionals in Malta. *Z Gesundh Wiss* 2022; 30: 2441-2448.
 13. González-Block MÁ, Gutiérrez-Calderón E, Pelcastre- Villafuerte BE, Arroyo-Laguna J, Comes Y, Crocco P, et al. Influenza vaccination hesitancy in 5 countries of South America. Confidence, complacency, and convenience as determinants of immunization rates. *PLoS One* 2020; 15: e0243833.
 14. Hou Z, Guo J, Lai X, Zhang H, Wang J, Hu S, et al. Influenza vaccination hesitancy and its determinants among elderly in China: a national cross-sectional study. *Vaccine* 2022; 40: 4806-4815.
 15. Smetana J, Chlibek R, Shaw J, Splino M, Prymula R. Influenza vaccination in the elderly. *Hum Vaccin Immunother* 2018; 14: 540-549.
 16. Abbas KM, Kang GJ, Chen D, Werre SR, Marathe A. Demographics, perceptions, and socioeconomic factors affecting influenza vaccination among adults in the United States. *PeerJ* 2018; 6: e5171.
 17. Alshammari TM, Yusuff KB, Aziz MM, Subaie GM. Healthcare professionals' knowledge, attitude, and acceptance of influenza vaccination in Saudi Arabia: a multicenter cross-sectional study. *BMC Health Serv Res* 2019; 19: 229.
 18. Alotaibi FY, Alhethel AF, Alluhaymid YM, Alshibani MG, Almuhaydili AO, Alhuqayl TA, et al. Influenza vaccine coverage, awareness, and beliefs regarding seasonal influenza vaccination among people aged 65 years and older in Central Saudi Arabia. *Saudi Med J* 2019; 40: 1013-1018.
 19. Al Hassan YT, Fabella EL, Estrella ED, Al Ramadan HA, Al Rajeh AM, Al Saleh FH. Association of vaccine awareness and confidence on the influenza vaccination status of Al Ahsa, Saudi Arabia residents. *Hum Vaccin Immunother* 2021; 17: 2190-2196.
 20. Hall CM, Northam H, Webster A, Strickland K. Determinants of seasonal influenza vaccination hesitancy among healthcare personnel: an integrative review. *J Clin Nurs* 2022; 31: 2112-2124.
 21. Pinatel N, Plotton C, Pozzetto B, Gocko X. Nurses' influenza vaccination and hesitancy: a systematic review of qualitative literature. *Vaccines (Basel)* 2022; 10: 997.
 22. Awaidy STA, K Al Mayahi Z, Kaddoura M, Mahomed O, Lahoud N, Abubakar A, et al. Influenza vaccination hesitancy among healthcare workers in South Al Batinah Governorate in Oman: a cross-sectional study. *Vaccines (Basel)* 2020; 8: 661.
 23. Domnich A, Orsi A, Trombetta CS, Guarona G, Panatto D, Icardi G. COVID-19 and seasonal influenza vaccination: cross-protection, co-administration, combination vaccines, and hesitancy. *Pharmaceuticals (Basel)* 2022; 15: 322.

González-Block MÁ, Pelcastre-Villafuerte BE, Riva Knauth D, Fachel-Leal A, Comes Y, Crocco P, et al. Influenza vaccination hesitancy in large urban centers in South America. Qualitative analysis of confidence, complacency, and convenience across risk groups. *PLoS One* 2021; 16: e0256040.