


Parents' Willingness to Vaccinate Their Children Against Seasonal Influenza After the COVID-19 Pandemic in Saudi Arabia: A Retrospective Cross-Sectional Survey

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Purpose: To explore the impact of the novel coronavirus (COVID-19) pandemic on caregivers' willingness to vaccinate their children against influenza in 2021 in Saudi Arabia and the factors influencing this decision.

Patients and Methods: An online survey of 2501 caregivers in Saudi Arabia with children aged 6 months–18 years was conducted between July 15, 2021, and August 2, 2021. A convenience sample of participants that met the inclusion criteria was used as the study sample. Social Science Package Statistical (SPSS) was used for the statistical analysis. Categorical variables were reported as frequencies and percentages. The Chi-square test was used for categorical variables to assess the difference between the variables and the parents' willingness to vaccinate their children against seasonal influenza after the COVID-19 pandemic.

Results: Of the 2501 respondents to the survey, 1185 (47.3%) parents plan to give their children the influenza vaccine next year, which is an increase from 745 (29.8%) in the previous year. The following were the main reasons for not giving children the vaccine: children were less likely to get seasonal flu (617, 24.7%), fear of side effects (491, 19.6%), and fear of needles and syringes (484, 19.4%). Among the parents, 1222 (48.9%) were more likely to receive the seasonal flu vaccine themselves the following year, and 1361 (54.4%), which is more than half, were concerned about their children contracting seasonal influenza.

Conclusion: Parents' decision-making to vaccinate their children against seasonal influenza has been influenced by the COVID-19 pandemic. Numerous factors including a caregiver who had received the seasonal influenza vaccine themselves, who had vaccinated or planned to vaccinate their children during the previous or current seasonal influenza season, and/or who had a higher education level were associated with increased willingness to receive the flu vaccine.

Keywords: seasonal flu, novel coronavirus, immunization, COVID-19

Introduction

Influenza viruses are single-strand RNA viruses that are members of the Orthomyxoviridae family. The two major influenza strains that cause seasonal influenza in humans are influenza types A and B.¹ Seasonal influenza affects the human population across the entire world, including children, with an estimated annual incidence of one billion cases, five million cases with severe disease, and up to 650,000 deaths.^{2–5} Compared to influenza, coronavirus disease (COVID-19)

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a severe acute respiratory syndrome has raised numerous concerns, as it spread across the world and resulted in a global pandemic with over 123 million cases and 2,722,000 deaths in less than a year.^{6,7} While COVID-19 and influenza have similar modes of transmission and symptoms such as cough, fever, runny nose, and headache distinguishing between the two requires targeted testing using molecular assays or antigen-based testing.^{8–11} To combat the spread of the virus, public health authorities have implemented a variety of mitigation measures, including frequent handwashing, social isolation, use of facial masks, and advocacy for COVID-19 vaccination.^{6,12–14}

Numerous studies have demonstrated that combining mitigation measures with complete vaccination series against COVID-19 is highly effective at reducing disease spread, hospitalization, and death; however, increased refusal to receive the vaccine due to widely circulated misinformation in the general population and the presence of the COVID-19 Delta variant have led to limited recent success in combating COVID-19.¹⁵ The community transmission of COVID-19 is likely to continue into the upcoming influenza season, thereby placing a more significant burden on health care systems.

Influenza vaccines are considered the best means to protect individuals from contracting the virus, as it is essential not only to prevent the illness but also to provide herd immunity for the community.^{6,16,17} The uptake of the influenza vaccine has been low in almost all countries despite the wide accessibility of the vaccine.¹⁸ However, despite the low vaccination rates, the influenza vaccine has been demonstrated to be effective, with approximately 49% of the US population receiving a flu vaccine during the 2018–2019 flu season, thereby averting an estimated 4.4 million influenza illnesses, 58,000 hospitalizations, and 3,500 deaths.¹⁹

In Saudi Arabia, the influenza vaccine is provided free of charge to the public and health care providers. Individuals aged over 6 months are eligible for the influenza vaccine if there is no contraindication.²⁰ Recently, Saudi Arabia's Ministry of Health released a statement emphasizing the critical role of the influenza vaccine in reducing the risk of significant mortality and morbidity associated with influenza during the COVID-19 pandemic.²¹ Furthermore, it appears that parents' intentions to vaccinate their child(ren) against seasonal influenza in the previous year are substantially related to their intentions to vaccinate their child this year. Nevertheless, in the context of a large disruption like

a pandemic, this phenomenon of previous vaccination behavior predicting future vaccination-related conduct has not been investigated.²² The literature review reveals that several factors are associated with parents' intentions to vaccinate their child against seasonal influenza following the COVID-10 pandemic, with numbers increasing from last year.^{4,22,23}

To the best of our knowledge, no research has been conducted in Saudi Arabia to determine whether COVID-19 has affected parents' willingness to have their child receive the influenza vaccine in 2021.

This study aims to explore the influence of the COVID-19 pandemic on the intention of parents in Saudi Arabia to vaccinate their children against seasonal influenza in 2021 and to identify the factors associated with their willingness to vaccinate their children.

Materials and Methods

Study Design and Study Population

This is a retrospective cross-sectional study conducted in Saudi Arabia and employed an online survey between July 15, 2021 and August 2, 2021. The study was conducted to assess if the COVID-19 pandemic influences the intention of parents in Saudi Arabia to vaccinate their children against seasonal influenza in 2021 and to identify factors that affect their willingness to vaccinate their children. All caregivers (parents and guardians) in Saudi Arabia (Saudi and non-Saudi) with children aged between 6 months and 18 years were included in this study. Children younger than 6 months and older than 18 years were excluded from this study.

Sampling Strategy

The study participants were recruited using a random convenience sampling technique. An invitation containing a link to the electronic survey was posted on social media platforms. The invitation was reposted every other day to increase the response rate and make it visible to a larger number of individuals. Social media users with active accounts and those who viewed the link were able to access the survey and complete it if they were eligible based on the abovementioned inclusion criteria.

Questionnaire Tool

The questionnaire was adopted and validated from a previous study.³ Questions addressed aspects such as demographic data, parental perception, actions toward

taking the influenza vaccine after the COVID-19 pandemic, and level of awareness in caregivers. The questionnaire was initially written in English and then translated and distributed in Arabic.

The section on demographic data included the age of the caregiver who completed the survey (guardians), marital status, nationality, family income, place of residence, level of education, whether the caregiver is a health care worker, the child's age and gender, whether the child has a medical condition or takes any medications, and whether the child is up to date on vaccinations.

We asked the caregivers five questions about vaccination against seasonal influenza and COVID-19: (1) "Did your child receive the flu vaccine in the last 12 months?"; (2) "Did you receive the flu vaccine in the last 12 months?"; (3) "Do you plan to have your child receive the flu vaccine next year after COVID-19?"; (4) "Do you plan to receive the flu vaccine next year after the COVID-19 pandemic?"; and (5) "Would you vaccinate your child against COVID-19 if a vaccination becomes available?"

Sample Size

We used the World Health Organization's (WHO) recommendations to calculate the sample size needed for this study. Using a confidence interval of 95%, and a margin of error of 5%, the required sample size was 385 participants from each study population.²⁴

Statistical Analysis

Social Science Package Statistical (SPSS) was used for the statistical analysis. Categorical variables were reported as frequencies and percentages. The Chi-square test was used for categorical variables to assess the difference between the variables and the "Parents' willingness to vaccinate their children against seasonal influenza after the novel coronavirus (COVID-19) pandemic." In addition, a p-value of less than 0.05 was considered statistically significant for all tests.

Ethical Statement

Ethical approval for this study (Ref.376-21) was obtained from the biomedical ethical committee at King Abdulaziz University Hospital (KAUH). A consent form for participation was included on the first page of the questionnaire, and all information pertaining to each participant (caregiver) remains strictly confidential. Each participant was informed about the purpose of the study and was required

to complete and sign the consent form. This study was conducted in accordance with the Declaration of Helsinki.

Results

From among 2501 participants, 862 (34.5%) were male, 1451 (58.0%) were mothers, 753 (30.1%) were in the age group of 36–45 years, and 703 (28.1%) were in the age group of 26–35 years. Moreover, 2435 participants (97.4%) were Saudi and 1753 (70.1%) had a university degree; 785 (31.4%, almost one-third) reported monthly incomes of USD 1334–USD 3200 and 611 (24.4%) reported monthly incomes of USD 3201–USD 5333. Furthermore, from among 2501 children, 1185 (47.4%) were girls. The majority of participants, 2310 (92.4%), confirmed giving their children the basic vaccinations listed in the Ministry of Health Vaccinations Schedule (Table 1).

Less than one-third (745, 29.8%) of the children received the seasonal influenza vaccine in the last year. The main reason selected for not giving the vaccine to their child(ren) was "My child is less likely to get seasonal flu"—617 (24.7%). Furthermore, one-third of the guardians received the seasonal influenza vaccine in the last year. The main reasons for guardians not receiving the vaccine were "I am less likely to get seasonal flu" (544, 21.8%), followed by "I don't trust news about the seasonal flu vaccine" (38, 15.2%). Almost half of the participants (1185, 47.4%) reported being "more likely to give the child the seasonal flu vaccine next year after the COVID-19 pandemic" and 1222 (48.9%) reported being "more likely to get the seasonal flu vaccine next year after the COVID-19 pandemic." In addition, over half of the participants (1361, 54.4%) stated that they "worried that their child would catch seasonal influenza" (Table 2).

Further, 667 participants (26.7%) and 346 children (13.8%) had suffered from COVID-19. The majority of the guardians (2086, 83.4%) had received the COVID-19 vaccine, and the 415 (16.6%) who had not received the vaccine planned to receive it in the near future. Moreover, 1851 guardians (74.0%) were willing to give their child the COVID-19 vaccine if the Ministry of Health permitted it. Table 3 presents details of cases where guardians worried that the child could suffer from it.

The main sources of information were the "Internet" (2230, 32.8%), followed by "Health workers" (1110, 16.3%), and "Social networking sites (such as Twitter and Instagram)" (981, 14.4%). The least-used source of

Table 1 Demographic Data of the Study Participants

Variable		N	%
Gender	Male	862	34.5
	Female	1639	65.5
Guardians	Father	796	31.8
	Mother	1451	58.0
	Others	254	10.2
Age	19–25 years	492	19.7
	26–35 years	703	28.1
	36–45 years	753	30.1
	Over 45 years	553	22.1
Nationality	Saudi	2435	97.4
	Non-Saudi	66	2.6
Marital status	Widowed	115	4.6
	Married	2162	86.4
	Divorced	224	9.0
Region	Southern region	582	23.3
	Eastern region	547	21.9
	Northern region	312	12.5
	Western region	604	24.2
	Central region	456	18.2
Educational level	Illiterate	41	1.6
	Elementary school	24	1.0
	Intermediate school	80	3.2
	High school	358	14.3
	Diploma	245	9.8
	Bachelor's	1459	58.3
	Higher Education (Master's and PhD)	294	11.8
Monthly income	Less than 800 USD	261	10.4
	USD 800–USD 1333	425	17.0
	USD 1334–USD 3200	785	31.4
	USD 3201–USD 5333	611	24.4
	Over USD 5333	419	16.8
	Working in health care field	No	2031
Yes		470	18.8

(Continued)

Table 1 (Continued).

Variable		N	%
Child age	6–11 months	236	9.4
	1–2 years	290	11.6
	3–5 years	477	19.1
	6–13 years	919	36.7
	14–18 years	579	23.2
Child gender	Female	1185	47.4
	Male	1316	52.6
Chronic illness	No	2283	91.3
	Yes	218	8.7
Receiving medication	No	2286	91.4
	Yes	215	8.6
Have you vaccinated your child with all the basic vaccinations according to the "Ministry of Health Vaccinations Schedule?"	No	191	7.6
	Yes	2310	92.4

information was the "Ministry of Health and pharmaceutical company reports" (366, 5.4%) (Table 4).

It was evident that participants from southern and western regions, those who had higher education, those who had monthly incomes between USD 3201 and USD 5333, and those who worked in sectors related to health care were more likely to vaccinate their children against seasonal influenza after the COVID-19 pandemic ($p < 0.0001$) (Table 5).

Further, parents of a girl or an unhealthy child, those who vaccinated their child with all the basic vaccinations according to the "Ministry of Health Vaccinations" schedule, those who took the vaccine last year, those worried that their child would catch seasonal influenza, those who had not been infected with COVID-19, those whose children had not been infected with COVID-19, those who had received or planned to receive or accept COVID-19 vaccination for their children, those who were concerned that their child would become infected with COVID-19, and those who trust the sources of medical information they chose were more likely to vaccinate their children against seasonal influenza after the COVID-19 pandemic ($p < 0.0001$). For more details in this regard, please refer to (Table 5).

Discussion

The purpose of this study was to determine the impact of the COVID-19 pandemic on the intentions of parents in

Table 2 Questions Regarding the Acceptability of the Seasonal Influenza Vaccine

Variable		N	%
Has your child been vaccinated with the seasonal influenza vaccine in the last 12 months?	No	1439	57.5
	Yes	745	29.8
	I do not know	317	12.7
If the answer to the previous question is "No," please specify the reason:	My child is allergic to the vaccine	135	5.4
	My child is afraid of needles and syringes	484	19.4
	My child is less likely to get seasonal flu	617	24.7
	My child has a health condition that prevents him from taking the vaccine	112	4.5
	Fear of my child getting seasonal flu because of the vaccine	355	14.2
	Fear of my child suffering from side effects from the seasonal flu vaccine	491	19.6
	Fear that the vaccine will not work	385	15.4
	I do not have enough time to vaccinate my child	314	12.6
	I do not trust news about the seasonal flu vaccine	429	17.2
Have you had the seasonal influenza vaccine in the last 12 months?	No	1391	55.6
	Yes	933	37.3
	I do not know	177	7.1
If the answer to the previous question is "No," please specify the reason	I am allergic to the vaccine	126	5.0
	Fear of needles and syringes	208	8.3
	I am less likely to get seasonal flu	544	21.8
	I have a health condition that prevents you from taking the vaccine	129	5.2
	Fear of seasonal flu due to vaccination	295	11.8
	Fear of side effects from the vaccine	355	14.2
	Fear that the vaccine will not work	345	13.8
	I do not have enough time to get vaccinated	373	14.9
	I do not trust news about the seasonal flu vaccine	381	15.2
Are you planning to give your child the seasonal flu vaccine next year after the COVID-19 pandemic?	Less likely	730	29.2
	More likely	1185	47.4
	No changes	586	23.4
Are you planning to get the seasonal flu shot next year after the COVID-19 pandemic?	Less likely	683	27.3
	More likely	1222	48.9
	No changes	596	23.8
Are you worried that your child will catch seasonal influenza?	No	915	36.6
	Yes	1361	54.4
	I do not know	225	9.0

Table 3 Questions Regarding the Acceptability of the COVID-19 Vaccine

Variable		N	%
Have you had the emerging COVID-19?	No	1759	70.3
	Yes	667	26.7
	I do not know	75	3.0
Has your child contracted the emerging COVID-19?	No	2061	82.4
	Yes	346	13.8
	I do not know	94	3.8
Have you taken the novel COVID-19 vaccine?	No	415	16.6
	Yes	2086	83.4
If the answer to the previous question is "No," do you plan to take it?	No	2086	83.4
	Yes	415	16.6
Would you accept giving your child the novel COVID-19 vaccine if it was allowed from the Ministry of Health?	No	378	15.1
	Yes	1851	74.0
	I do not know	272	10.9
Are you worried that your child may be infected with the emerging COVID-19?	No	502	20.1
	Yes	1851	74.0
	I do not know	148	5.9

Saudi Arabia to vaccinate their children against seasonal influenza in 2021 and to identify the characteristics associated with such intentions. In this study, the majority of the study population was from the central and western regions, as these two regions have the highest population among all regions in Saudi Arabia; moreover, the younger age of the study population was also representative of the overall Saudi population.²⁵

Our results demonstrate that almost half of the participants (47.4%) are willing to give their children the seasonal flu vaccine next year, following the COVID-19 pandemic. After the COVID-19 pandemic, almost half of the guardians (48.9%) are more open to receiving the seasonal flu vaccine the following year. In comparison, only one-third of children (29.8%) received the seasonal influenza vaccine in the previous year. Furthermore, the association between the item "Parents' willingness to vaccinate their children against seasonal influenza following the COVID-19 pandemic" and the item "Seasonal

Table 4 Questions Regarding the Information Sources and Trust of the Vaccine

Variable		N	%
Usual sources of medical information (n = 6809)	Internet	2230	32.8
	Ministry of Health and pharmaceutical company reports	366	5.4
	Social networking sites (such as Twitter and Instagram)	981	14.4
	Media (such as television or radio)	837	12.3
	Scientific articles	668	9.7
	Health workers	1110	16.3
	Family and friends	617	9.1
Do you trust the sources you have chosen?	No	208	8.3
	Yes	1939	77.5
	I do not know	354	14.2

influenza vaccine information" was significant. In addition, guardians were more likely to vaccinate their children against seasonal influenza if they themselves had received the seasonal influenza vaccine, if they were concerned their children might catch the flu, or if they had vaccinated or planned to vaccinate their children during the previous or current rounds of seasonal influenza vaccine (p 0.0001).

Concurrent pandemics of influenza and COVID-19 will be a complicated challenge.²⁶ Consequently, this could result in high morbidity and mortality and place a strain on the health care sector.^{6,27} In addition, the global demand for influenza vaccines has increased dramatically from February 2020 to March 2020.²⁸ Over half of our study participants vaccinated their children during the COVID-19 pandemic, thereby reflecting the extent of the impact of the pandemic on the vaccine. Numerous factors contribute to parental vaccine decision-making and increased vaccine willingness. These factors include trust in the advice given by the health care practitioner, mainstream medicine, social networks, sources of vaccination knowledge, and general attitudes toward health.²⁹

Almost half (54.2%) of the 2422 caregivers indicated an intention to vaccinate their children next season, a notable increase from the past year (15.8%).⁴ Similarly, parents who planned to vaccinate or had previously vaccinated their children were more likely to immunize them

Table 5 Factors Associated with the Parents' Willingness to Vaccinate Their Children Against Seasonal Influenza After the Novel Coronavirus (COVID-19) Pandemic

Variable		Are You Planning to Give Your Child the Seasonal Flu Vaccine Next Year After the COVID-19 Pandemic?			P value
		Less likely N (%)	More likely N (%)	No changes N (%)	
Gender	Male	235	423	204	0.285
		32.2%	35.7%	34.8%	
Guardians	Father	214	391	191	0.052
		29.3%	33.0%	32.6%	
	Mother	456	664	331	
		62.5%	56.0%	56.5%	
	Others	60	130	64	
		8.2%	11.0%	10.9%	
Age	19–25 years	129	254	109	0.070
		17.7%	21.4%	18.6%	
	26–35 years	225	300	178	
		30.8%	25.3%	30.4%	
	36–45 years	225	361	167	
		30.8%	30.5%	28.5%	
Over 45 years	151	270	132		
	20.7%	22.8%	22.5%		
Nationality	Saudi	716	1154	565	0.291
		98.1%	97.4%	96.4%	
	Non-Saudi	14	31	21	
		1.9%	2.6%	3.6%	
Marital status	Widowed	28	60	27	0.809
		3.8%	5.1%	4.6%	
	Married	636	1019	507	
		87.1%	86.0%	86.5%	
	Divorced	66	106	52	
		9.0%	8.9%	8.9%	

(Continued)

Table 5 (Continued).

Variable		Are You Planning to Give Your Child the Seasonal Flu Vaccine Next Year After the COVID-19 Pandemic?			P value	
		Less likely N (%)	More likely N (%)	No changes N (%)		
Region	Southern region	162	321	99	0.0001**	
		22.2%	27.1%	16.9%		
	Eastern region	195	237	115		
		26.7%	20.0%	19.6%		
	Northern region	74	141	97		
		10.1%	11.9%	16.6%		
Western region	148	308	148			
	20.3%	26.0%	25.3%			
Central region	151	178	127			
	20.7%	15.0%	21.7%			
Educational level	Illiterate	13	20	8		0.0001**
		1.8%	1.7%	1.4%		
	Elementary school	9	8	7		
		1.2%	0.7%	1.2%		
	Intermediate school	36	28	16		
		4.9%	2.4%	2.7%		
	High school	108	184	66		
		14.8%	15.5%	11.3%		
	Diploma	76	105	64		
		10.4%	8.9%	10.9%		
	Bachelor's	432	677	350		
		59.2%	57.1%	59.7%		
Higher Education (Master's and PhD)	56	163	75			
	7.7%	13.8%	12.8%			

(Continued)

Table 5 (Continued).

Variable		Are You Planning to Give Your Child the Seasonal Flu Vaccine Next Year After the COVID-19 Pandemic?			P value
		Less likely N (%)	More likely N (%)	No changes N (%)	
Monthly income	Less than USD 800	96	125	40	0.0001**
		13.2%	10.5%	6.8%	
	USD 800–USD 1333	147	188	90	
		20.1%	15.9%	15.4%	
	USD 1334–USD 3200	229	360	196	
		31.4%	30.4%	33.4%	
USD 3201–USD 5333	157	293	161		
	21.5%	24.7%	27.5%		
Over USD 5333	101	219	99		
	13.8%	18.5%	16.9%		
Working in the health care field	No	604	923	504	0.0001**
		82.7%	77.9%	86.0%	
	Yes	126	262	82	
		17.3%	22.1%	14.0%	
Child age	6–11 months	68	121	47	0.116
		9.3%	10.2%	8.0%	
	1–2 years	87	146	57	
		11.9%	12.3%	9.7%	
	3–5 years	134	224	119	
		18.4%	18.9%	20.3%	
	6–13 years	282	411	226	
		38.6%	34.7%	38.6%	
14–18 years	159	283	137		
	21.8%	23.9%	23.4%		
Gender of child	Female	291	605	289	0.0001**
		39.9%	51.1%	49.3%	
	Male	439	580	297	
		60.1%	48.9%	50.7%	

(Continued)

Table 5 (Continued).

Variable		Are You Planning to Give Your Child the Seasonal Flu Vaccine Next Year After the COVID-19 Pandemic?			P value
		Less likely N (%)	More likely N (%)	No changes N (%)	
Chronic illness	No	647	1100	536	0.007*
		88.6%	92.8%	91.5%	
	Yes	83	85	50	
		11.4%	7.2%	8.5%	
Receiving medication	No	659	1094	533	0.272
		90.3%	92.3%	91.0%	
	Yes	71	91	53	
		9.7%	7.7%	9.0%	
Have you vaccinated your child with all the basic vaccinations according to the "Ministry of Health Vaccinations Schedule"?	No	77	66	48	0.0001**
		10.5%	5.6%	8.2%	
	Yes	653	1119	538	
		89.5%	94.4%	91.8%	
Has your child been vaccinated with the seasonal influenza vaccine in the last 12 months?	No	520	503	416	0.0001**
		71.2%	42.4%	71.0%	
	Yes	121	533	91	
		16.6%	45.0%	15.5%	
	I do not know	89	149	79	
		12.2%	12.6%	13.5%	
Have you had the seasonal influenza vaccine in the last 12 months?	No	513	456	422	0.0001**
		70.3%	38.5%	72.0%	
	Yes	170	643	120	
		23.3%	54.3%	20.5%	
	I do not know	47	86	44	
		6.4%	7.3%	7.5%	

(Continued)

Table 5 (Continued).

Variable		Are You Planning to Give Your Child the Seasonal Flu Vaccine Next Year After the COVID-19 Pandemic?			P value
		Less likely N (%)	More likely N (%)	No changes N (%)	
Are you planning to get the seasonal flu shot next year after the COVID-19 pandemic?	Less likely	578	65	40	0.0001**
		79.2%	5.5%	6.8%	
	More likely	96	1079	47	
		13.2%	91.1%	8.0%	
	No changes	56	41	499	
		7.7%	3.5%	85.2%	
Are you worried that your child will catch seasonal influenza?	No	366	272	277	0.0001**
		50.1%	23.0%	47.3%	
	Yes	305	840	216	
		41.8%	70.9%	36.9%	
	I do not know	59	73	93	
		8.1%	6.2%	15.9%	
Have you had the emerging COVID-19?	No	536	825	398	0.0001**
		73.4%	69.6%	67.9%	
	Yes	168	340	159	
		23.0%	28.7%	27.1%	
	I do not know	26	20	29	
		3.6%	1.7%	4.9%	
Has your child contracted the emerging COVID-19?	No	601	982	478	0.001*
		82.3%	82.9%	81.6%	
	Yes	92	178	76	
		12.6%	15.0%	13.0%	
	I do not know	37	25	32	
		5.1%	2.1%	5.5%	
Have you taken the COVID-19 vaccine?	No	148	151	116	0.0001**
		20.3%	12.7%	19.8%	
	Yes	582	1034	470	
		79.7%	87.3%	80.2%	

(Continued)

Table 5 (Continued).

Variable		Are You Planning to Give Your Child the Seasonal Flu Vaccine Next Year After the COVID-19 Pandemic?			P value
		Less likely N (%)	More likely N (%)	No changes N (%)	
If the answer to the previous question is "No," do you plan to take it?	No	92	24	37	0.0001**
		12.6%	2.0%	6.3%	
	Yes	117	213	87	
		16.0%	18.0%	14.8%	
	I do not know	39	31	26	
		5.3%	2.6%	4.4%	
Not applicable	482	917	436		
	66.0%	77.4%	74.4%		
Would you accept giving your child the COVID-19 vaccine if it was allowed by the Ministry of Health?	No	195	77	106	0.0001**
		26.7%	6.5%	18.1%	
	Yes	421	1039	391	
		57.7%	87.7%	66.7%	
	I do not know	114	69	89	
		15.6%	5.8%	15.2%	
Are you worried that your child may be infected with the emerging COVID-19?	No	209	154	138	0.0001**
		28.6%	13.0%	23.5%	
	Yes	472	983	397	
		64.7%	83.0%	67.7%	
	I do not know	49	48	51	
		6.7%	4.1%	8.7%	
Do you trust the sources you have chosen?	No	104	57	47	0.0001**
		14.2%	4.8%	8.0%	
	Yes	534	996	409	
		73.2%	84.1%	69.8%	
	I do not know	92	132	130	
		12.6%	11.1%	22.2%	

Note: *p<0.05, **p<0.0001.

against the flu the following year.⁶ The fear of contracting COVID-19 or influenza might have positively impacted parents' decision to vaccinate their children.^{4,28} These findings are similar to those reported by Seiler et al on the acceptance of the influenza vaccine during the COVID-19 pandemic.²³

In Saudi Arabia, the COVID-19 vaccination has gained widespread acceptance. Data from Saudi Arabia indicated that two-thirds of caregivers vaccinate their children against COVID-19.³⁰ A recent survey conducted in six countries revealed similar observations.³¹ Our findings indicated that most participants (74%) intended to

vaccinate their children against COVID-19 once the vaccine was approved by the Ministry of Health, thereby decreasing fears regarding the possible consequences and side-effects of the vaccine.

The outbreak of the pandemic and the consequent devastation to human life has sparked the desire to immunize against COVID-19 and influenza.^{32–34} This has resulted in parents' growing acceptance of vaccination as a method of infection prevention. Therefore, parents who have planned to vaccinate their children or have already vaccinated their children against COVID-19 are more likely to vaccinate them against seasonal influenza as well.

Furthermore, the aspects of education level, monthly income, and attitude toward the health care system contribute significantly to vaccine acceptance ($p < 0.0001$). Almost 95% of parents who routinely vaccinate their children are enthusiastic about immunizing them against seasonal influenza. This could be a result of increased confidence in the health care system following satisfactory vaccination experiences.

Other studies confirmed our findings as well, thereby revealing a significant association among educational level, immunization record, and the likelihood of receiving seasonal influenza vaccination the following year.⁴ Moreover, a higher level of education correlates with a more significant potential to comprehend vaccine-related information.^{6,35} Although almost half of the study population obtained vaccine information through the Internet and social media, our study found that a large percentage of parents were willing to vaccinate their children. This could also be due to the fact that 70.1% of study participants hold a university degree.

In contrast to our findings, a recent study found that the COVID-19 pandemic does not appear to have significantly increased the rates of seasonal influenza vaccination. Furthermore, it may have a detrimental effect on the phase shift of immunization status.²² One plausible reason for this may be that prior researchers conducted their studies early in the pandemic, when the COVID-19 vaccine was unavailable, as the primary factor influencing the intention to obtain the influenza vaccination is prior vaccination history. Another factor that could explain their findings is the effect of lockdown and homeschooling on pediatric age groups. Thus, parents may overlook the importance of the influenza vaccination for their children. The campaign of the Saudi Arabian Ministry of Health to encourage residents to vaccinate against

influenza may increase parents' willingness to vaccinate their children.

Furthermore, socioeconomic status strongly correlates with vaccine acceptance; low-income individuals have a low level of vaccine acceptance.²⁸ Although Saudi Arabia offers vaccinations at no cost, our data indicate that low socioeconomic status is associated with vaccination rejection and a markedly reduced desire to learn about the vaccine.

Vaccines were developed to help protect both patients and health care professionals.^{36,37} Healthcare providers undoubtedly frequently encounter individuals with influenza and COVID-19 complications. The COVID-19 pandemic has brought intervention strategies and public perceptions of influenza vaccines into sharp focus. Consequently, consistent promotion of public health mitigation strategies is essential, particularly among low-educated individuals and those with large families. Despite this, public health stakeholders continue to be concerned about COVID-19 misinformation.³⁸

Psychological science has identified various strategies for increasing vaccine coverage, including social norms to increase vaccine intention (through social media, health care providers, or public awareness campaigns).^{22,39,40} The COVID-19 pandemic may have affected public perceptions of vaccination, which may influence future vaccination programs.²⁸ Although our research found an increased intention to get the influenza vaccine compared to last year, our sample size did not represent the entire population. In addition, despite the vaccine's importance and awareness of the complications related to influenza, the belief in immunogenicity to prevent infection is a reason that people are refusing the vaccine.

Our study has several limitations. First, a major limitation in convenience sampling is representation of the population; however, given the objectives of this study and the current COVID-19 pandemic situation in which a large proportion of people working from home due to lockdowns and other governmental restrictions, we assume that the results of the study can be generalized to the Saudi population. Second, the questionnaire was written exclusively for Arabic readers, thereby creating an obstacle for those who cannot not read Arabic. Third, we rely on guardians' responses to verify vaccination status. Finally, guardians' actions may contradict their stated intentions regarding vaccination following the eradication of the COVID-19 pandemic.

Conclusion

This study revealed that parents' intention to vaccinate their children against seasonal influenza has been influenced by the COVID-19 pandemic. Numerous factors were associated with an increased willingness to receive the flu vaccine: having received the seasonal influenza vaccine, having vaccinated or planning to vaccinate their children during the previous or current seasonal influenza season, and having a higher education level. The Ministry of Health in Saudi Arabia must coordinate public awareness campaigns that emphasize the importance of getting an influenza vaccination for children.

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