

Caregivers' Sources of Information About Immunization as Predictors of Delayed Childhood Vaccinations in Saudi Arabia During the COVID-19 Pandemic: A Cross-Sectional Questionnaire Study

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Purpose: This study compared the most used sources of information by caregivers for scheduled childhood vaccination in Saudi Arabia before and during the COVID-19 pandemic and examined the effect of this decision-making.

Methods: An electronic survey was administered to 577 caregivers of children aged ≤ 2 years residing in Saudi Arabia during the COVID-19 pandemic curfew. The sources of information on childhood vaccination considered by the caregivers and their influence on the caregivers' decision to delay scheduled vaccination were assessed and statistically analyzed.

Results: Most participants (90.8%) were mothers aged 32.6 ± 5.7 years. Before the pandemic, most caregivers sought information about children's vaccinations personally from the healthcare workers, or trustworthy sources, including the Ministry of Health (MOH), MOH call center 937, and MOH Sehha app. However, during the pandemic, there was a noticeable decrease in the searches for health information through professional consultations (in person and health websites) and a significant increase in the use of social media platforms. Twitter was the most used platform (29.9%) and the use of Snapchat was significantly higher during the lockdown period compared to its use before the pandemic (21.9% vs 17.2%, $P < 0.001$). The use of social media not only increased the level of fear among the caregivers but also had a negative effect on their decisions about children's vaccinations. Searches on YouTube and Facebook particularly increased the odds of delaying vaccinations by 2.63 times ($P = 0.008$) and 3.66 times ($P = 0.025$), respectively.

Conclusion: During the pandemic, caregivers' health-information seeking behavior was directed towards social media networking. In Saudi Arabia, YouTube and Facebook, in particular, played an important role in the caregivers' decision-making about childhood vaccinations. The results of this survey provide valuable information on how to reach the Saudi population and launch an effective awareness campaign using the most commonly accessed and influential sources of information.

Keywords: caregivers' decision, COVID-19, pandemic, immunization, social media, telehealth, health apps

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Introduction

Health information-seeking behavior is the process of obtaining knowledge from multiple sources regarding health information and protective health behaviors.^{1,2} This behavior has been documented in the literature through the information



sources populations seek and trust for specific health information. The last decade witnessed a rise in the internet sources readily available to the public, to independently search reliable and unreliable health information.

During the 2020 COVID-19 global lockdown, populations relied heavily on digital health resources and online sources of health information to address existing or emerging health conditions at home. Recent studies identified the most-used sources of health information during the pandemic to be online journalism, and social media.^{3,4} These online sources reportedly aggravated the stress levels of their users.⁴ Although the use of internet sources for health-risk information increased during the severe acute respiratory syndrome (SARS) and influenza A virus (H1N1) epidemics, it was not as high as speculated (25% and 56%, respectively).⁵ However, there was no global curfew or stay-home order during these past pandemics.

Before the pandemic, however, all social media platforms were available for all age groups; but they were mostly used by younger generation and mainly for pleasure.^{1,3} Additionally, the public relies heavily on watching news reported on traditional TV; and they usually use social media and other platforms for surfing and browsing.^{1,4} When it comes to finding important information related to health issues, they seek such information from health websites but not the social media platforms;^{1,2} even though social media platforms are more accessible and are available at any time where users can access any health program at any time compared to traditional sources of information.^{3,4}

During the COVID-19 pandemic, a decline in the childhood vaccination rate was reported worldwide,⁶ and Saudi Arabia had a negative effect on child vaccination timeliness owing to the fear of being infected by COVID-19.^{7,8} Consequently, there was a massive decrease (73%) in vaccination rates in Saudi Arabia during April and May 2020 compared to the same period 3 years ago.⁹

Parents weighing the benefits of childhood vaccination versus the risk of getting infected with COVID-19, referred to different in-person and impersonal sources of information. In the previous pandemics and epidemics, parents and caregivers faced similar worries.¹⁰ Literature shows that parents used social media as an important and essential information source to make informed decisions about vaccinating their children during the COVID-19 pandemic.¹¹

In this study, we compare the sources of health information that parents or caregivers in Saudi Arabia sought before and

during the pandemic, to assist them in the decision to vaccinate or delay vaccinations for their children (aged ≤ 2 years). This comparison attempts to capture any change in parental behavior when thinking of childhood vaccination during the pandemic lockdown. The 2nd objective is to test whether the source of information on vaccination is associated with delayed childhood vaccination during the pandemic.

Materials and Methods

Study Population and Design

This study is part of a research project on the effects of the COVID-19 pandemic on childhood immunization in Saudi Arabia. The setting, sampling, tool development, data collection, analyses, the study procedures complied with Good Clinical Practice and the Declaration of Helsinki and have been described in detail in our previous study.⁸ The questionnaire had sections about the participants' and their children's demographics, and other variables, including health and health service-related factors, vaccination delay and its reasons, media exposure, and the scale of level of fear from COVID-19 with higher scores indicating a severe fear level.⁸

Using the snowball method, we surveyed 577 parents or primary caregivers of children aged ≤ 2 years in Saudi Arabia during the pandemic lockdown. Participants were approached during the early phase of the COVID-19 pandemic curfew (March 24–July 6, 2020). A validated Arabic and English survey was self-administered online through Google Forms.⁸ Invitations were promoted via WhatsApp and other social media like Twitter, Snapchat, and Facebook to engage hard-to-reach parents and caregivers. We assessed the sources of health information that could influence the decision about vaccinating children during the pandemic period; these sources include social media platforms (YouTube, WhatsApp, Facebook, Instagram, Twitter, Snapchat, Google, Telegram, and TikTok), traditional media (television, newspapers, and radio), news reports on the COVID-19 pandemic, healthcare professionals, family, friends either verbally or via WhatsApp, and co-workers. Health call centers, websites, and apps including the Ministry of Health (MOH) Sehha app and MOH call center 937 were also included. Other independent variables examined were the sociodemographic characteristics, social distancing, child's characteristics, and health care factors.

We compared the behavior and sources of information on vaccination considered by the parents and caregivers before and during the COVID-19 pandemic lockdown with regard to decisions about childhood vaccination. Data will be shared upon reasonable request and after

approval from the institutional review board. Additional materials could be required during the process of assessment. De-identified participant data will be provided after approval by the investigators.

Statistical Analysis

A power analysis was performed for sample size estimation. The projected sample size needed was $N=304$ assuming the response rate will be 50%, and 85% power (type-I error rate=0.05). However, the response rate was greater than expected leading to a larger sample size ($N=577$).

We used McNemar's test to determine the differences in the prevalence of using each source of health information before and after the pandemic with $\alpha=0.05$ as a level of statistical significance. The association between the information sources and the delay in vaccination during the pandemic was examined using logistic regression models. The regression models were adjusted for a range of potential confounders, including sociodemographic factors, caregivers' and children's ages, chronic diseases, health care factors, scheduled-vaccination history of older siblings, and COVID-19 factors (exposure to COVID-19, admission to the intensive care unit [ICU], and fear of COVID-19). The data was analyzed using the Statistical Package for Social Sciences v. 27 (SPSS v.27, IBM Corp., USA).

Ethical Statement

Details about informed consent by the survey participants and the approval by the institutional review board at King Saud University College of Medicine for conducting this study are available (Ethics Approval Number: E-20-4795).⁸ Before participation, all potential participants were given the purpose of the study and the opportunity to contact the principal investigator for any clarifications. The eligible participants, who were willing to voluntarily participate, signed an informed written consent. The informed consent was obtained after the nature and possible consequences of the study had been fully explained to the participants. Participation was voluntary, responses were anonymous, participant details have been kept confidential, and have been used only for data analysis.

Results

Participants' Characteristics

The total number of participants was $N=577$. The majority of participants were mothers (524/577, 90.8%), Saudi nationals (540/577, 93.6%), and married women (559/577, 96.9%). The mean age of the caregivers was 32.6

Table 1 Characteristics of Primary Caregivers and Children ($N=577$)

	n (%)	Mean (SD)
Mean score for level of COVID-19 fear		21.98 (5.5)
Average weekly hours spent on social media platforms	11.2	
Social media or news reports on the COVID-19 pandemic increased fear levels	347 (60.1)	
Delaying children's vaccination due to COVID-19 fear		
Delayed	206 (35.7)	
Not delayed	371 (64.3)	
Missed (incomplete) vaccinations at		
Birth	3 (1)	
2 months	15 (5)	
4 months	36 (12)	
6 months	40 (14)	
9 months	55 (19)	
12 months	46 (16)	
18 months	35 (12)	
24 months	65 (22)	

(± 5.7) years, 78% of caregivers reported that their children's vaccinations were up to date, and 48.2% of participants had private health insurance. Participants used the primary healthcare centers as the main place for vaccinations (280/577, 48.5%), followed by 31% (179/577) who went to private hospitals and 20.5% (118/577) used government hospitals. The demographic variables of the caregivers are reported in our previous study.⁸

The mean level of COVID-19 fear was 21.9 (± 5.5) and 60% (347/577) of the participants reported that reading or watching reports about COVID-19 on social media platforms or the news increased their level of fear. There were 35.7% (206/577) of participants who delayed their children's routine vaccinations due to COVID-19. The most missed or delayed vaccinations (65/295, 22%) were at 24 months of age followed by the 9-month vaccinations (55/295, 19%) and the 12-month vaccinations (46/295, 16%) (Table 1).

Social Media Platforms and Other Sources of Information Used

Before the COVID-19 pandemic, 38.1% (220/577) of caregivers used to seek information regarding their children's vaccinations personally from healthcare workers, followed by the MOH call center 937 (123/577, 21.3%), MOH Sehha app (69/577, 11.9%), and other health websites (56/577, 9.7%). Additionally, caregivers were not seeking information

Table 2 Comparison of Information Sources About Children's Vaccinations Before and During the COVID-19 Pandemic (N=577)

Source of Information	Before COVID-19 n (%)	During COVID-19 n (%)	P value
"I did not search nor took the opinion of others to delay my child's vaccination."	7 (1.2)	175 (30.3)	<0.001*
MOH call center 937	123 (21.3)	77 (13.3)	<0.001*
MOH Sehha App	69 (11.9)	30 (5.2)	<0.001*
Other health apps	17 (2.9)	8 (1.4)	0.078
In-person health care, professional nurse, doctor, dietitian, health educator	220 (38.1)	77 (13.3)	<0.001*
Health professional or institute on social media	19 (3.3)	15 (2.6)	0.597
Non-health professional or institute on social media	2 (0.3)	1 (0.17)	1.000
Family and friends	61 (10.5)	50 (8.7)	0.300
Health websites	56 (9.7)	12 (2.1)	<0.001*
Spouse		61 (10.6)	
TV		13 (2.3)	
Others	3 (0.52)	58 (10.1)	

Note: * $P < 0.05$ was considered statistically significant.

from traditional media (television) or immediate family (spouses). During the COVID-19 pandemic, the decrease (77/577, 13.3%) in in-person consultations with healthcare workers and the use of the MOH call center 937 showed a statistically significant difference ($P < 0.001$). The use of the MOH Sehha app and other health websites decreased to 5.2% (30/577) and 2.1% (12/577), respectively ($P < 0.001$). Not searching for information online or taking the opinion of other people to delay vaccinations was mentioned by only 7/577 (1.2%) participants before the pandemic while it was mentioned by 30.3% (175/577) of participants during the pandemic, this was a statistically significant difference ($P < 0.001$) (Table 2).

Participants in our study used >1 social media platform and there were no users of any single social media platform. Before the pandemic, 29.9% (173/577) of the participants used to get information from Twitter followed by WhatsApp (115/577, 20%), Snapchat (99/577, 17.2%), and Instagram (76/577, 13.1%) (Figure 1). During the pandemic, the use of these social media platforms as sources of information was almost the same as before the pandemic except for Snapchat, which was used by more participants (126/577, 21.9%), this was a statistically significant increase ($P < 0.001$).

Sources of Information and the Odds of Delaying Childhood Vaccinations

Regarding the effect of different social media platforms on delaying vaccinations, using YouTube increased the odds of delaying vaccinations by 2.63 times ($P = 0.008$) and using Facebook increased the odds of delaying vaccinations by 3.66 times ($P = 0.025$). However, the use of Twitter did not increase the odds of delaying vaccinations (OR=0.85, $P = 0.69$).⁸

Regarding other sources of information and their effect on delaying vaccination, many associations were statistically significant. Asking a healthcare professional in person was associated with higher odds of delaying the vaccine (OR=2.75, P-value <0.001), similarly, asking family and friends or asking a husband or wife was associated with higher odds of delaying the vaccine with an OR=2.43 ($P = 0.003$) and (OR=3.84, $P < 0.001$), respectively. There was insufficient data to analyze the results for Google, Telegram, and TikTok. However, some factors decreased the odds of delaying the vaccinations, including calling the MOH call center 937 (OR=0.50, $P = 0.02$) and using the MOH Sehha app (OR=0.16, $P = 0.01$). After adjusting for confounders (caregivers' and children's ages and chronic diseases, the history of receiving

Social Media

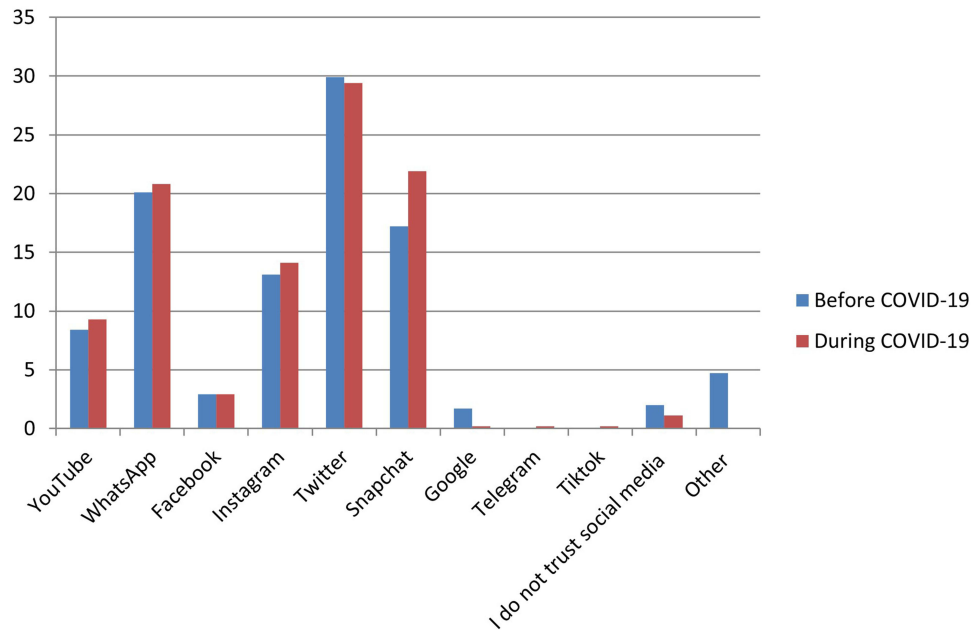


Figure 1 The use of social media platforms as sources of information before and during the COVID-19 pandemic.

scheduled vaccination for older siblings, and COVID-19 factors (exposure to COVID-19, admission to ICU, and level of fear of COVID-19), only use of the MOH Sehha app showed a statistically significant reduction in the odds of delaying vaccination. Adjusted and unadjusted odds ratios and their significant levels are shown in Table 3.

Discussion

Sources of Information About Vaccination

Few international papers study the information sources about COVID-19.^{3,4,12,13} One of these studies¹³ examined the overall change in telehealth before and after COVID-19. However, none of the studies compared the differences in the sources of health information before and during the COVID-19 pandemic and the impact of these sources on the caregivers' decisions to delay the vaccination of children. Knowing the sources of information that people trust, to make informed health decisions during times of a public health emergency is important for planning population risk communication, and assessing the perceptions of received information through online social listening and sentiment analysis.¹⁴ This is important for tracking the emerging infodemic by identifying the sources of misinformation and disinformation,¹⁴ comparing the difference in the sources sought before and during the pandemic, and

detecting the change in health information-seeking behavior in the Saudi parent population during a public-health emergency.

During the COVID-19 pandemic, the highest Saudi authority responsible for credible information is the MOH.¹⁵ Our study shows that traditional media like television, radio, and newspapers, although used by the MOH for health messaging before and during the pandemic, the caregivers did not turn to traditional media for health advice. This could be because the caregivers' age group (young adult aged 18–35 years) tends to seek more information online,¹⁶ and the electronic format of the survey can result in a sampling bias. This aligns with a study on childhood vaccination in Saudi Arabia during the pandemic reporting social media as the most preferred source of information.⁸ Despite emerging evidence about the effect of the COVID-19 pandemic on childhood vaccination in Saudi Arabia,^{7–9} limited evidence is available about the sources of information for childhood vaccination during the pandemic. One of the studies has reported the most preferable sources of health information during the pandemic⁷ and in line with our findings, social media is reported to be the most preferred source of information regarding children's vaccinations followed by television and newspapers (70% and 30%, respectively). Previous literature shows that the parents' main sources of

Table 3 Unadjusted and Adjusted Regression Models for Decisions About Delaying Children's Vaccinations and Sources of Information During the COVID 19 Pandemic (N=577)

	Unadjusted Model			Adjusted Model ^b		
	OR ^a	P value	95% CI	OR	P value	95% CI
Social Media						
YouTube	2.63	0.008	1.3–5.4	2.4	0.09	0.87–6.6
WhatsApp	0.99	0.98	0.53–1.8	1.02	0.96	0.49–2.1
Facebook	3.66	0.025	1.2–11.4	4.1	0.04	1.04–16.5
Instagram	1.001	0.99	0.50–2.01	0.80	0.62	0.33–1.96
Twitter	0.76	0.37	0.42–1.4	0.85	0.69	0.40–1.8
Snapchat	1.093	0.78	0.60–2.01	1.6	0.26	0.72–3.5
Sources of Information						
I did not search nor took the opinion of others to delay my child's vaccination	2.281	<0.001*	1.6–3.3	0.46	<0.001*	0.30–0.70
MOH call center 937	0.50	0.02*	0.27–0.91	0.58	0.12	0.30–1.1
MOH Sehha App	0.16	0.01*	0.04–0.69	0.17	0.02*	0.03–0.79
Other health applications	0.80	0.78	0.16–4.02	0.45	0.37	0.08–2.60
In-person health-care professional (nurse, doctor, dietitian, health educator)	2.75	<0.001*	1.7–4.5	3.65	<0.001*	2.04–6.5
Health professional or institute on social media	1.21	0.73	0.41–3.6	1.83	0.32	0.55–6.04
Family and friends	2.43	0.003*	1.4–4.4	2.53	0.005*	1.3–4.8
Spouse	3.84	<0.001*	2.2–6.6	4.13	<0.001*	2.2–7.7
Health website	7.59	0.003*	2.03–28.4	8.11	0.003*	2.06–31.8

Notes: ^aReference group, had not delayed vaccinations; ^bmodel adjusted for caregivers' and children's ages and chronic diseases, history of receiving scheduled vaccination for older siblings, and COVID-19 factors (exposure to COVID-19, admission to the intensive care unit, and level of fear of COVID-19). *P<0.05 level was considered statistically significant.

information on vaccination before the pandemic were non-medical sources,¹⁷ mainly social media (56%).¹⁸

Health Apps

There was a decrease in the use of the MOH call center 937 and free public health apps to ask about vaccines during the pandemic. This could be explained by the surge of calls and app users during the pandemic for all health-related inquiries leading to decreased accessibility; as there were longer wait times in queue on the calls, and the apps were crashing or slow, and sometimes were not working. This could imply that the public perceive the MOH as a trusted source of information,^{19,20} evident by the favorable association between use of the MOH Sehha app and the decreased likelihood of delaying vaccination. However, the decreased use of other health apps goes against local and international reports of increased telehealth and digital health use during the pandemic.¹³ A possible explanation is that other health apps providing health consultations in Saudi Arabia are commercial and require service fees,²¹ or that there was decreased awareness among the general population about other non-MOH health consultation apps.

Interpersonal Networks

As anticipated, due to the decrease in access to health care centers during the curfew, seeking information from health care professionals was significantly decreased during the pandemic. However, those who did consult health care professionals were 3.65 times more likely to delay childhood immunization. This could suggest increased fear of COVID-19 among health care professionals during the pandemic, leading to personal views that do not align with government messaging. A similar observation was reported during the SARS and H1N1 epidemics.⁵ Therefore, our results highlight the strong influence of interpersonal social networks on health decisions in Saudi Arabia.^{10,20,22,23} The odds of delaying children's vaccinations were significantly higher among caregivers seeking vaccination information from family, friends, and spouses. Such interpersonal effects on vaccination decisions have been reported not only in the Saudi population,^{7,9,17,18,24} but also worldwide.^{25–27}

Social Media

The behaviour of the whole nation was shifted to digital platforms.²⁸ The change was noticeable in the usage of

social media in 2020²⁸ compared to the previous 2 years.²⁹ The usage of social media increased by 2.1 million (+8.0%) in Saudi Arabia. The number of these users was equivalent to 79.3% of the total population. Indeed, the government health websites were regularly updated, and the Saudi MOH has initiated social media accounts to report daily updates about COVID-19 and promotes public health measures.^{13,19,20} The MOH dedicated health messaging through its social media platforms to urge people to maintain their children's immunization schedules and reassure them that efforts were in place to have safe primary health care centers with a low risk of being infected with COVID-19.¹⁹ As part of the consumer behavior of health-information seeking in Saudi Arabia, people look up health information directly from social media platform search bars.¹⁶ In many other countries, social media platforms influenced vaccination decisions even before the pandemic.^{11,27}

There was a slight increase in the use of social media platforms during the pandemic in Saudi Arabia. We found that participants used >1 source of information and >1 social media platform, which is a globally observed trend.⁵ Although caregivers were asked an open-ended question to list all reasons that lead to vaccination delay, none of them listed a specific social media platform. Amongst the social media platforms, Twitter was the most prevalent (29.9%) and although it had no influence on the vaccination decision, its use was associated with higher fear levels.⁸ In addition to Twitter, the use of Snapchat was significantly higher during the lockdown compared with its usage before the pandemic (126/577, 21.9% vs 99/577, 17.2%, $P < 0.001$), with no statistically significant effect on the decision about childhood vaccination. In Saudi Arabia, Snapchat is the most favored platform (45.8%),³⁰ it is used mainly by young adults (18–35 years). It is possible that the caregivers were exploring new social media platforms during the lockdown to overcome social challenges, such as the restriction of social gatherings.

Caregivers can easily find information about vaccination on social media such as Snapchat; it was one of the social media accounts initiated by the Saudi MOH to report daily updated about COVID-19.^{13,19,20} Snapchat provides in-app resources called “Here For You” feature which enable users to find more information about any topic. During the pandemic, Snapchat has expanded its “Here For You” feature to include more information about health, mental health and wellbeing. Parents who

were searching for terms such as “COVID-19”, “vaccine”, “child”, “vaccination” were directed to expert National Health Service (NHS) resources.³¹ Additionally, Snapchat has been found as a promising tool for health information and education especially among younger generation.³² Globally, many doctors are active on Snapchat to provide virtual health information attracting young adults.³³ In Saudi Arabia, licenced physicians and medical professionals established social media accounts (Snapchat is one of them) for virtual consultations and health promotion during the pandemic; it was started as an individuals' initiative out of their good heart on social media during the lockdown and soon after, the Saudi government adopted the individual initiatives and transformed it into an organized nationwide volunteer program with an official website.³⁴ On the contrary, few social media influencers, who are neither a medical profession nor giving the correct medical information, were providing misleading health information (ie infodemic).

Effect of Age and Gender

The sociodemographic profiles of the caregivers in our study population can be considered one of the important determinants for obtaining information from different social media platforms during the pandemic. Age group and gender distribution influence the use of internet-based sources and social media compared to traditional sources of information; most of the caregivers in our study population are young women. Compared to men, women are more likely to seek health information from all available sources, and they are more likely to be concerned about health information, especially for their children.^{4,35} Moreover, our caregivers were young and frequently sought health information from multiple social media platforms.^{4,36} Younger women sought health information via internet-based sources during other epidemics, including Ebola.³⁷ This finding about the influence of age and gender support the social-media use demographics in Saudi Arabia.^{16,38}

Online Arabic Content

Since the beginning of the pandemic, social media posts about COVID-19 on Facebook, Twitter, Snapchat, Instagram, and YouTube are flagged with a message that directs users to credible sources of information about COVID-19, including the World Health Organization and Centers for Disease Control and Prevention websites.^{39,40} However, this is not the case for Arabic content on these

platforms. Potentially, Arab social media influencers could be a tool for combating COVID-19-related misinformation in the Arabic content.⁴¹ Our results show that parents and caregivers rarely sought non-healthcare-professional social media figures for the decision to delay childhood vaccinations before or during the pandemic.

YouTube and Facebook were statistically significantly associated with higher odds of delaying the vaccinations and this finding needs further investigation. Perhaps the MOH awareness activities are not sufficiently strong on these platforms. Another explanation is the misleading information (especially Arabic content) disseminated via YouTube and Facebook about vaccination.^{26,41–46} This could be a future source of anti-vaccine campaigns targeting Arabic speaking populations, especially Middle-Eastern parents.²⁶ These campaigns could be in organized groups or by individual public figures; anti-vaccine advocates have been posting many misleading videos about vaccinations on YouTube.⁴⁷ This anti-vaccination movement is fueled by social media⁴⁸ and can be a potential national and global threat.

Strengths and Limitations

This study has numerous strengths. We described a social and behavioral aspect of the COVID-19 pandemic and compared it to pre-pandemic behavior. The response from our caregivers' survey was adequate and representative. The association between the decision to delay vaccination and the sources of information during the COVID-19 pandemic were adjusted for possible confounders in the regression model. The vaccination history of older siblings was considered in the regression model to eliminate the possible effects of the caregivers' beliefs⁴⁹ and their vaccination hesitancy⁵⁰ in their decision to delay their children's vaccination during the COVID-19 pandemic.

This study has some limitations. The snowball sampling could have affected the social media platform answers, given the platform where the participant received the electronic survey. To avoid legal liability, we did not ask social-media users about the specific accounts where they got their information, as not immunizing children is considered a form of neglect that could be legally pursued in Saudi Arabia.

Conclusion

The access to health information through social media platforms during the pandemic lockdown had considerably increased specially to Twitter and Snapchat. These platforms had played an important role in the caregivers'

decision-making about childhood vaccinations. Therefore, health authorities can consider health information dissemination through the utilization of the most commonly accessed and most influential sources of information by the public. Likewise, dissemination of health messaging to target secondary audience such as health care providers, family, friends, and spouses, who have a significant influence on parents and caregiver's decision-making. Future national crisis-preparedness planning needs to target these sources of information for health promotion and ensure they contain reliable health information, which is regularly updated and monitored.

Abbreviations

MOH, Ministry of Health; SARS, Severe Acute Respiratory Syndrome; H1N1, Influenza A virus.

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Disclosure

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