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Research Article

Impact of Coronavirus Disease 2019 (COVID-19) Pandemic on Routine Pediatric Vaccination in Eastern Region, Saudi Arabia

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ABSTRACT

Background: The Corona Virus Disease 2019 (COVID-19) caused by the novel Coronavirus strain Severe Acute Respiratory Syndrome-Corona Virus 2 (SARS-CoV-2) is currently a pandemic. On January 30, 2020, the World Health Organization declared that the COVID-19 outbreak is a public health emergency of international concern. The lockdown across the countries has resulted in a postponement of routine immunization programs following the recommendations of maintaining a physical distance. Delay of routine pediatric vaccinations, even for a short duration will result in an increased likelihood of vaccine-preventable. The primary objective of this research is to assess the impact of the COVID-19 pandemic on the routine childhood vaccination coverage rate in the eastern region of Saudi Arabia.

Methods: A cross-sectional study through an online questionnaire. The targeted population was both male and female adults who have children at the age of vaccinations who are residents of the eastern region of Saudi Arabia during the period between July 2020 and September 2020.

Results: 494 respondents participated in this study. 378 of them have children. 76.5% of them have Children had vaccination schedule during COVID-19 pandemic. 66.9 vaccinated their children. 33.1% of parents their children did not receive vaccines during COVID-19. 82.8% of parents think vaccines should be given at its time even during the COVID pandemic.

Conclusion: One out of every three children has missed their routine vaccinations during the COVID-19. The pool of unimmunized children is expanding during the lockdown, making them susceptible to vaccine-preventable diseases. Most of the parent knows the importance of routine pediatric vaccinations.

Keywords: Knowledge; Attitude; Practice; COVID-19; Saudi Arabia

INTRODUCTION

Corona Viruses (CoV) are a wide family of viruses that cause illness manifest as the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). COVID-19 is a new type of coronavirus that appeared in China, Wuhan at the end of December 2019 in the form of acute pneumonia. It was linked to the seafood and animal market in Wuhan, China [1]. At the end of December 2019, several patients were hospitalized with an initial diagnosis of an unclear etiology of pneumonia. These patients were epidemiologically related to the wholesale market for seafood and wet animals in Wuhan, Hubei Province, China [2]. On 30 January 2020, the World Health Organization (WHO) officially announced the COVID-19 outbreak as a public health emergency around the world [3]. COVID-19 virus is primarily transmitted between humans through respiratory droplets and contact. Airborne transmission might occur in specific procedures or support treatments that generate aerosols such as endotracheal intubation, bronchoscopy, and open suctioning [4].

Internationally, WHO as well as the Center for Disease Control and Prevention (DCC) recommended policies and protocols to prevent the spread of COVID-19 like social distancing, frequent hand hygiene after touching any surface, wearing universal masking [5]. Locally, the ministry of health in Saudi Arabia implemented proactive bold measures to limit the transmission of the disease such as travel restriction, virtual schooling, total and partial lockdowns, suspension of Umrah, and restricting hajj to a very limited number of pilgrims [6,7].

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Statistically, coronavirus (COVID-19) is affecting 213 countries and territories around the world and 2 international conveyances. The Last updated statics of COVID-19 confirmed cases on June 18, 2020, over the world reached 8,494,633 total confirmed cases globally, while the total number of deaths related to COVID-19 complications: 452,669, and just:4,450,448 recovered from the total cases. The active cases: 3,591,516, Currently Infected Patients: 3,537,007 (98%) in mild stable condition, while 54,509 (2%) in serious critical condition due to COVID-19 related complications. While closed cases are: 4,903,117 cases which had an outcome of: 4,450,448 (91%) recovered/discharged, and only 452,669 (9%) Deaths. Locally Last updated cases in Saudi Arabia: at June 18, 2020, total Coronavirus Cases: 145,991, Deaths: 1,139, Recovered: 93,915 [8]. However, the closed cases are: 95,054, cases which had an outcome: 93,915 (99%) that Recovered/Discharged, 1,139 (1%) Deaths [9]. While the total active Cases: 50,937, including 1,877 Total Critical Cases. Furthermore, the total confirmed cases in AlHassa are: 7765, the active Cases: 2734, Total recovered Cases: 5003, Deaths: 28 [10].

Childhood Immunization is the mechanism by which an individual is made immune or resistant to an infectious disease, mainly by administering an infectious disease Vaccination. Vaccines stimulate the body's immune system to protect an individual against subsequent infection or illness [11]. Pediatric vaccination saves an estimated 2–3 million lives worldwide per year, substantially leading to a decline in the worldwide infant mortality rate from 65 per 1,000 live births in 1990 to 29 in 2018. Vaccinations have been described as the most cost-effective solution to reducing childhood disease burden [12].

The ongoing COVID-19 pandemic is a reminder of the importance of vaccination. This pandemic resulted in a decrease in the rate of immunization as parents postponed doctor visits to maintain physical distance and prevent infection with COVID-19 [13]. This decline in vaccination coverage rate can lead to increased vulnerability to vaccine-preventable diseases. The declines in routine pediatric vaccine ordering and doses administered could indicate that U.S. children and their communities undergo an increase in the risk of vaccine-preventable disease outbreaks. The pandemic has led to delays and marked disruption in regular vaccine programmed [14]. WHO estimates that as COVID-19 surges, 117 million children are at risk of missing the measles vaccine [15].

Without vaccination, deaths could occur which will result in a range of diseases including measles, yellow fever, pertussis, meningitis, pneumonia, and diarrhea. The impact of missing immunization could be devastating for individual families as well as for the health care system, as it would burden the already overcrowded health care facilities [16]. Routine pediatric vaccine data from the Children's Vaccines Program and Vaccine Safety Datalink from January 6–April 19, 2020, found the sharpest decline in measles immunization in the US. Any interruption of immunization programs, particularly for a brief period, would lead to an increased risk of diseases preventable by vaccinations such as measles outbreaks [17].

METHODS

Study design

A cross-sectional study was conducted to explore the Impact of the COVID-19 pandemic on routine childhood vaccination coverage rate and the attitude of the parents towards their children routine vaccination during the pandemic in the Eastern region of Saudi Arabia of both Saudi and non-Saudi population. Because a community-based sampling survey is not feasible due to the current circumstances of social distancing, the tool that we used to conduct the study was an online Google form questionnaire distributed through the use of different types of social media apps including what's up, Twitter and Telegram.

Survey tool, instrument, dissemination, and validation

The survey questionnaire was designed in Arabic, as it is the native language in Saudi Arabia. The survey consists of 23-items that were developed and published during the period between July 2020 and September 2020 with 494 responses. Some of those items have been conducted and validated by the WHO Regional Office for Europe. A small adjustment to the survey was made to encourage clearer interpretation and coordinate the questions before the final survey was sent to the targeted population through a Google link to the Alahsa population.

The survey takes approximately 3-4 minutes to be completed. The 27-item questionnaire was divided into six parts: participant characteristics (7 items), Vaccine related data (5 items), Vaccination history during COVID-19 (5 items), Caregivers attitude towards vaccines (3 items), Personal data and information source (7 items). Knowledge and perception were assessed by questions focusing on COVID-19 signs and symptoms, transmission, high-risk group, and risk prevention.

Sample

The sample size that Google form showed was 494 responses with a margin of error of 5% and 95% confidence interval. A minimum of 300 responses was required for the study [18].

Validation of the study

For validation purposes, the questionnaire was first proposed to three experts in the field of research to check if the questions in the questionnaire adequately measure the Impact COVID-19 pandemic on routine pediatric vaccination. After that, the questionnaire was pretested by distributing the questionnaire to 13 participants who were excluded from the study later. The internal consistency of these data from these questionnaires was assessed using Cronbach's alpha. The result showed appropriate internal consistency (Cronbach's alpha=0.82).

RESULTS

Four hundred and ninety-four participants from different areas in the Eastern Region of Saudi Arabia completed the survey.

Data analysis

After data were extracted, it was revised, coded, and fed to statistical software IBM SPSS version 22 (SPSS, Inc. Chicago, IL). All statistical analysis was done using two-tailed tests. A p-value of less than 0.05 was statistically significant. Descriptive analysis based on the frequency and percent distribution was done for all variables including caregiver's demographic data, children vaccination data, attitude towards vaccines, and child vaccination practice. Cross tabulation was used to assess the distribution of child vaccination practice during the COVID-19 pandemic according to participants' data and their source of information regarding vaccines. Relations were tested using the Pearson chi-square test (Table 1).

Table 1: Demographic data of children and caregivers.

Demographic data	No	%
Relation to the child		
Mother	283	57.30%
Father	118	23.90%
Siblings	31	6.30%
Others	62	12.60%
Respondent age		
18-30	206	41.70%
31-40	184	37.20%
41-50	80	16.20%
>50	24	4.90%
Nationality		
Saudi	475	96.20%
Non-Saudi	19	3.80%
Educational level		
Below university	120	24.30%
University/more	374	75.70%
Job		
Health-related job	120	24.30%
Non-health care worker	374	75.70%
Have children between 0-6 years		
Yes	378	76.50%
No	116	23.50%
Number of children (n=378)		
1	271	71.70%
2	82	21.70%
3	14	3.70%
4	11	2.90%

It illustrated the demographic data of children and caregivers. The relation to the child contribution of the participants was 57.3% by mothers, 23.9% for fathers, 6.3% for siblings, and 12.6% for others. For the age distribution, the largest proportion of the participants were between 18-30 years (41.7%) followed by those between 31-40 years (37.2%), 41-50 (16.2%) while 4.9% came from participants aging 50 years and more. Only 19 (3.80%) were non-Saudi. As regards the educational level, most of the participants had an education university level or higher than the university level (75.7%). Exact of 374 (75.7%) had a non-health-related bachelor's degree. On the other hand, 120 (24.3%) had a health-related bachelor's degree. 378 (76.5%) participants Have children between 0-6 years. Out of these participants (71.7%) have only one child, (21.7%) have two children, (3.7%) have three children, (2.9%) have four children (Table 2).

Table 2: Children vaccination data before the covid-19 pandemic.

Children vaccination data before the covid-19 pandemic	No (378)	%
Vaccine related to the firstborn child		
Yes	93	24.60%
No	285	75.40%
Gender of the child		
Male	152	40.20%
Female	179	47.40%
Both	47	12.40%
Previous delay in vaccination schedule before the pandemic		
Yes	96	25.40%
No	282	74.60%
7child is due for vaccination during the pandemic		
Yes	289	76.50%
No	89	23.50%
Type of scheduled vaccines		
Birth vaccine	13	4.60%
4 months of vaccines	100	35.10%
2 months of vaccines	117	41.10%
6 months of vaccines	41	14.40%
9 months of vaccines	73	25.60%
12 months of vaccines	20	7.00%
18 months of vaccines	72	25.30%
2 Years. vaccines	25	8.80%
4-6 Years. vaccine	54	18.90%

Children vaccination data before the covid-19 pandemic: most of the vaccines were not related to the first family child (75.4%). 96 (25.4%) participants have previously delayed their child vaccination before the COVID pandemic while most of the participants (74.6%) previously not delayed their child vaccination before the COVID pandemic. Most of the participants (76.5%) have a Child has vaccination schedule during COVID-19 pandemic, types of schedule vaccine as followed Birth vaccine (4.6%), 2 months' vaccines (41.1%), 4 months' vaccines (35.1%), 6 months' vaccines (14.4%), 9 months' vaccines (25.6%) 12 months' vaccines (7.0%) 18 months vaccines (25.3%) 24 months' vaccines (8.8%) 4-6 years' vaccines (18.9) (Table 3).

Table 3: Children vaccination data during the covid-19 pandemic.

Children vaccination data during the covid-19 pandemic	No	%
The child received vaccines during COVID-19		
Yes	253	66.90%
No	125	33.10%
Precaution is taken during a visit (n=253)		
Wearing masks	218	86.20%
Wearing gloves	113	44.70%
Social distancing	229	90.50%
Hand hygiene after touching materials	226	89.30%
Had a company for help	62	24.50%
Reason for missing the vaccine (n=125)		
Fear of visiting a health care facility	53	42.40%
Vaccines can be delayed with no risk	35	28.00%
No vaccination schedule for the child	37	29.60%
Due to lockdown	5	4.00%
Not sure about vaccine efficacy	1	0.80%
Had the vaccine at home	5	4.00%

Reason for getting the vaccine on time (n=378)		
Fear of being unvaccinated	228	60.30%
Vaccines improve child immunity	255	67.50%
Adherence to medical staff recommendations	118	31.20%
Family and friends' advice	27	7.10%
The preferred method to deliver child vaccine during COVID-19 (n=378)		
Visit PHCC through a scheduled appointment	191	50.50%
Home health care service	137	36.20%
Delay till the end of COVID-19	32	8.50%
Visiting PHCC without an appointment	18	4.80%

Children vaccination data during the covid-19 pandemic: 253 (66.9%) of the Children received vaccines during COVID-19 and the precautions taken during the visits, wearing the mask (86.2%), wearing gloves (44.7%), social distancing (90.5%), Hand hygiene after touching material (98.3%), had a company for help (24.5%). 125 (33.1%) of the Children missed their vaccination during COVID-19. The main reason behind missing the vaccination was fear of going to a health facility in (42.4%), vaccines can be delayed without any risk (28.0%), the child was not due for vaccination (29.6%), lockdown (4.0%), Had the vaccine at home (4.0%), and a small number of them did not believe in the effectiveness of the vaccines (0.8%),

On the other hand, (67%) of children get their vaccinations on time and the reasons behind that are because their parents think that vaccines improve child immunity (67.5%), or because of fear of the risks associated with under-immunization (60.3%), (31.2%) of parents gave the vaccines on time for their children during the pandemic because they adhere to a medical staff recommendation, and (7.1%) because of Family & friends' advice. The most preferred participant's method to deliver child vaccination during the COVID-19 pandemic was visiting Primary health center (PHC) through scheduled appointment (50.5%), other methods were home health care service (36.2%) and visiting PHC without an appointment (4.8%). 32 (8.5%) of participants preferred to delay vaccinations till the end of the COVID-19 pandemic (Table 4).

Caregivers attitude towards vaccines	Yes		No		Don't know	
	No	%	No	%	No	%
Vaccines help in COVID-19 infection spread	24	6.30%	251	66.40%	103	27.20%
	62	16.40%	237	62.70%	79	20.90%
Vaccines should be given at its time even during the COVID pandemic	313	82.80%	34	9.00%	31	8.20%

Caregiver's attitude towards vaccines: we asked if Vaccines help in COVID-19 infection spread, most answered no (66.4%), 24 (6.3%) answered yes and 103 (27.2%) do not know. We asked about the risks associated with delaying vaccines till the end of the COVID-19 pandemic, most of the participants answered there is no risk (62.7%), 62 (16.7%) answered yes there is a risk, and 79 (20.9%) do not know. We asked if Vaccines should be given at its time even during the COVID-19 pandemic, most participants answered yes (82.8%), 34 (9%) answered no, and 31 (8.2%) do not know (Figure 1).

Caregivers source of information about vaccination. The most stated source of information was counseling health care staff and guide book (43.7%) and (42.1%) respectively, followed by the internet (20.6%), social media (19.6%), through health application (14.3%), myself (3.2%) (Table 5).

Table 5: Child vaccination during COVID-19 practice.

Personal data and information source		The child received vaccines during COVID-19				P-value
		Yes		No		
		No	%	No	%	
Relation to the child	Mother	168	66.90%	83	33.10%	0.498
	Father	63	66.30%	32	33.70%	
	Siblings	5	50.00%	5	50.00%	
	Others	17	77.30%	5	22.70%	
Respondent age	18-30	121	76.10%	38	23.90%	.004
	31-40	95	58.30%	68	41.70%	
	41-50	35	68.60%	16	31.40%	
	>50	2	40.00%	3	60.00%	
Nationality	Saudi	246	66.80%	122	33.20%	0.834
	Non-Saudi	7	70.00%	3	30.00%	
Educational level	Below university	58	65.20%	31	34.80%	0.686
	University/more	195	67.50%	94	32.50%	
Job	Health-related job	81	80.20%	20	19.80%	001
	Non-health care worker	172	62.10%	105	37.90%	
previous delay in vaccination schedule before the pandemic	Yes	55	57.30%	41	42.70%	020
	No	198	70.20%	84	29.80%	

Source of information	Guidebook	106	66.70%	53	33.30%	0.077
	Consulting health care staff	119	72.10%	46	27.90%	
	Social media	44	59.50%	30	40.50%	
	Internet	48	61.50%	30	38.50%	
	My self (health care staff)	11	91.70%	1	8.30%	
	Through the "Health" application	39	72.20%	15	27.80%	

It shows child vaccination during COVID-19 practice. Exact of 77.3% of the children for other family members were vaccinated compared to 50% for those where the caregiver is their siblings with no statically significance (P=.498). As for respondent age, 76.1% of children for young aged respondents (18-30 years) were vaccinated compared to 40% for old aged respondents (P=.004). Also, 80.2% of children for caregivers providing health care (Health care workers) were vaccinated during the pandemic in comparison to 62.1% of others (P=.001). The vaccination rate was significantly higher among childcare givers who not previously delayed your child vaccination before the COVID pandemic than others who did (70.2% vs. 57.3%, respectively; P=.020). Exact of 91.7% of children for caregivers who had their information regarding vaccines from the study were vaccinated compared to 59.5% of those for caregivers who had their data from social media (P=.077).

DISCUSSION

Global attention and response have been drawn toward the COVID-19 pandemic as a public health emergency of international concern. The COVID-19 pandemic has a dramatic impact on routine vaccination globally as routine immunization services provision has been significantly affected at least 68 countries and an estimated 80 million children under the age of 1 living in these countries, thus raising the risk of vaccine-preventable diseases [19]. The current study aims to assess the impact of the COVID-19 pandemic on routine pediatric vaccination in the eastern region in Saudi Arabia.

Our result shows that about 33.1% of parents did not vaccinate their children during the pandemic. Our finding suggests that most of the parents still adhere to routine childhood immunization during the pandemic. Many factors have been identified as reasons for delaying immunization. Among all the factors, fear of going to a health care facility and catch the infection was the highest accounting for about 42.4%. Furthermore, 28% of parents of unvaccinated children think there is no risk of delaying vaccination until the pandemic over. 25.4% of parents have previously delayed their child immunization before the pandemic. Many parents were uncertain if routine childhood vaccinations particularly at the beginning of the lockdown were classified as an 'essential service' or not. Parents of vaccinated children reported that vaccines improve child immunity as a reason for giving their child the vaccines on time. Most of the parents took precautions during the visit by keeping social distance, adhering to hand hygiene, wearing facemasks.

Our findings on the attitude of caregivers towards vaccines showed that 82.8% agreed that vaccines should be given on time even during the COVID-19 pandemic. Furthermore, 62.7% believed that there will be harm if vaccines were delayed till the end of the COVID-19 pandemic. Collectively, the present findings highlight the level of awareness of the parents. Table 4 shows that 66.4% of the parents believed that there is no relationship between visiting the PHC for vaccine and spreading the infection of COVID-19, 6.3% linked between the vaccine visit and spreading COVID-19 infection, while 27.2% didn't know if there is any association between visit the PHC for vaccine and spreading the infection of COVID-19.

During the pandemic, about 50.5% preferred to visit PHC through scheduled appointment to get the vaccine, while 36.2% preferred home health care service for vaccination, another interesting finding was about 8.5% of participants decided to delay the vaccination till the end of the COVID-19 pandemic. This study showed that there might be an association between the level of education of the parents and adherence to routine childhood vaccination. There was no significant inverse relationship was found between parents who delayed vaccination and the birth order of their children as a reason for missing or delaying the vaccines.

A significant result was found between children who were vaccinated during the COVID-19 pandemic and the respondent's job. We found that people who work in the health care sector are more prone to vaccinate their children on time (80%), While 62.1% of vaccinated children's parental job or their siblings' job was not related to the health sector. We also found a significant relationship between children who were vaccinated during the COVID-19 pandemic and the history of the previous delay in vaccination before the COVID-19 pandemic. Data analysis showed that 70.2% of children who were vaccinated did not have a history of delayed vaccination, while 57.3% of vaccinated children have a positive history of delayed vaccination. Most of the parents reported that their knowledge about the continuation of routine vaccinations came from consulting a health care staff and following the vaccination guidebook. Where others also reported social media networks, the internet and health application as a source of information shown in Figure 1.

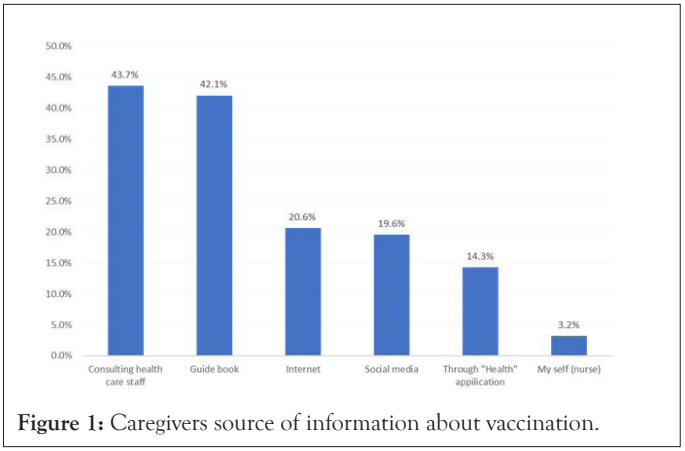

Figure 1: Caregivers source of information about vaccination.

Our findings are similar to a study was conducted by Sadie Bell, which shows that most parents continued to view vaccines as important during the early phase of the COVID-19 pandemic, with similar levels of agreement on the importance of vaccinating children to the pre-COVID period. Most parents and guardians wanted to vaccinate their children during the COVID-19 pandemic; however, they experienced barriers that influenced their capability, motivation, and opportunity to vaccinate their children [20].

However, a recent study conducted in Sub-Saharan Africa goes against our finding, which shows a decline in vaccination rates, indicating that parents do not bring their children back to health facilities for the subsequent controls and vaccinations, likely due to fear of contagion [21]. Another study done in Saudi Arabia in Riyadh city shows a significant decline of all vaccination visits during the COVID-19 pandemic lockdown April and May 2020 except for the birth vaccinations compared to the number of vaccinations visit in 2017 to 2019 [22]. Our results provide evidence on the importance of ensuring that that all children receives up to date vaccination should be made clear in immunization publicity. To save lives that would otherwise be lost to vaccine-preventable diseases, vaccination of children under five years of age is essential [16].

STUDY STRENGTHS AND LIMITATIONS

IThe main limitation of this study appears to be the setting area and a small number of participants. Lack of researches done in this field was also one of our limitations. We managed to overcome that by writing our questionnaire and apply it to our community. We suggested that more research should be done to investigate the effect of COVID-19 Pandemic on vaccination. However, this study can provide initial data about the condition of vaccination in the eastern region during the pandemic. Also, this study provides important information on the barriers faced by parents during the pandemic to improve and maintained routine childhood vaccination. Identifying populations at risk of under immunization is essential to plan effective intervention for increasing vaccination coverage. The study was conducted by using an online google form and was sent to different media platforms such as WhatsApp, telegram, Twitter. As a result, only people who have access to these platforms had been involved in this study, and the participation of people with limited access could affect the result of certain aspects. The tool used to collect the data is a self-reported survey and there is the possibility that the population may give socially desirable answers especially on attitude questions because they are expected to hold a positive attitude, as they perceive (Mortel, 2008).

CONCLUSION

Coronavirus Disease (COVID-19) had affected the routine pediatric vaccination in the Eastern region, Saudi Arabia. It made one third miss their routine vaccinations during the pandemic. Children who are not protected by vaccines will be more vulnerable to diseases such as measles. The identified declines in routine pediatric vaccine ordering and doses administered might indicate that children and their communities face increased risks for outbreaks of vaccine-preventable diseases. In the study, 66% of the parents believed that there is no relationship between visiting the PHCC for vaccine and spreading the infection of COVID-19. 70% of children who were vaccinated did not have a history of delaying vaccination.

While 57.3% of vaccinated children have a positive history of delaying vaccination, 42% of parental concerns were about potentially exposing their children to COVID-19 during well-child visits. Most of the parents took precautions during their visit for vaccinations by keeping social distance, using hand sensitizer after touching materials, wearing facemasks and gloves to protect their children against serious vaccine-preventable diseases, even as the COVID-19 pandemic continues. Many parents knew the value of continuing to vaccinate their children even in the COVID-19 pandemic and their knowledge of continuing regular vaccines was gained from consulting with health care workers and following the vaccine guidebook.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Ethics Committee of Almoosa Specialist Hospital. Before filling the survey, and according to the Helsinki declaration, there was a statement that declares that Participant's secrecy and privacy were guaranteed. Submission of a complete answered survey was considered as an agreement to share in the study.

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