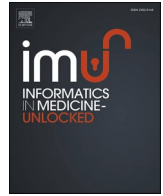




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Attitude of parents toward vaccination against COVID-19 for own children in Jordan: A cross-sectional study

Sawsan Abuhammad^{a,*}, Yousef Khader^b, Shaher Hamaideh^c

^a Maternal and Child Health Nursing Department, College of Nursing, Jordan University of Science and Technology, Irbid, 22110, Jordan

^b Department of Public Health, Faculty of Medicine, Jordan University of Science and Technology, Jordan

^c Community and Mental Health Nursing Department, Faculty of Nursing, The Hashemite University, Zarqa, Jordan

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ABSTRACT

Aim: To evaluate parents' attitudes toward the COVID-19 vaccination for their children and determine predictors of parents' attitudes towards their children receiving the Vaccine against COVID-19.

Method: This study used a cross-sectional design. The subjects were Jordanian parents with a child less than 18 years old. The survey was made available on different social media platforms and other networks such as community organizations, academic posts, and private groups.

Results: There was a difference in the attitude of parents toward COVID-19 vaccination for their children according to their demographic and personal characteristics ($p = .05$). Attitude of parents toward vaccination against COVID-19 for their own children was more likely to be significant and impacted by gender, nationality, job status, level of income and if their child had previously received influenza vaccine.

Conclusion: This is a large national study regarding the attitude of parents toward vaccination against COVID-19 for their own children in Jordan. This study found that more than fifty percent of the parents were hesitant to allow their children to receive COVID-19 vaccination.

1. Introduction

The emergence and dissemination of a relatively secure vaccine against COVID-19s has been a major development in the COVID-19 epidemic fight. However, there is indeed a heated debate over whether the vaccine against COVID-19 should be administered to children and young adults [1–3]. The knowledge, wellness, and very well being of society are all at stake [3]. Furthermore, proof, suggestions from health organizations such as WHO scientific regarding vaccination have evolved significantly over time, with significant variation across countries [3,4].

The first stage of COVID-19 vaccinations targeted adults only, except for the Pfizer mRNA vaccine, which could be administered to adolescents aged 16 and up. As a result, the urgent administration of the Pfizer vaccine to children aged 12 and up was authorized in the United States in early April 2021 [5]. Pfizer vaccines were also given provisional approval for use in children [5]. For example, the Centers for Disease Control and Prevention and America (CDC) have both endorsed immunization of children aged in 2021. Moreover, many states found that 13% of children under the age of 18 have received full vaccinations [10].

In the European Union (EU), the Pfizer vaccine received temporary permission to use for children in late May 2021. Similarly, the EU approved Moderna mRNA for administration to older children 12 and up in July 2021. All these approvals were based on positive short-term trial results [6,7]. Vaccine against COVID-19 recommendations vary by country, especially when it comes to children. Many studies in the United States, the United Kingdom, and Sweden showed applying of various strategies to protect children [8,9].

Similarly, on July 19, 2021, the UK Joint Committee on Vaccination and Immunization expressed support for vaccination of children older 12–16 years just if they are highly susceptible due to severe neuro-disability [11].

Most discussions about vaccination strategies and recommendations for children and young adults focus on the intangible benefits to individuals and society outside of these age groups because they account for a small proportion of the COVID-19 burden [12,13]. For instance, it is often expected that vaccinating the younger population assists families to return to normal activities and lower the spread to and death of older individuals who the younger people may infect. Access to the Vaccine against COVID-19 for children to the end of the pandemic is

* Corresponding author.

E-mail addresses: Shabuhammad@just.edu.jo (S. Abuhammad), shaher29@hu.edu.jo (S. Hamaideh).

currently a global priority [1].

Vaccine hesitancy is not a new thing in the US. A recent example is the re-emergence of measles years before the COVID-19 outbreak. Equally, there are specific population sub-groups across the globe from which high vaccine reluctance has been reported. Specifically, the World Health Organization stated that vaccine hesitancy was a major global health threat even before the emergence of the COVID-19 pandemic [1]. However, while significant interest and expectancy for the Vaccine against COVID-19 exist, limited information about the Vaccine against COVID-19 hesitancy is available, especially among the US population [14]. Therefore, determining the populations and their characteristics regarding vaccine hesitancy will be helpful in the implementation of an effective strategy when the Vaccine against COVID-19 is made available to the public or young children [15]. Assessing parents' attitudes towards COVID-19 vaccination for children in Jordan is important in developing an intervention to facilitate COVID-19 vaccination for children. These interventions will prevent misinformation, increase Vaccine against COVID-19 acceptability, and increase the number of children receiving the vaccine. Some parents may be distrustful or skeptical about vaccines in general, and then maybe with COVID-19 specifically [4]. Therefore, this study aims to assess parents' attitudes toward the COVID-19 vaccination for their children and determine predictors of parents' attitudes towards COVID-19 vaccination for their children.

2. Methods

2.1. Design and participants

This study is a cross-sectional study using surveys that fits with the aims of the study with assessing the attitude of parents toward vaccination for their children. The participants were Jordanian parents with a child less than 18 years old and living in Jordan at the time of data collection. A priori analysis was conducted to approximate the required sample size. Based on the total adult population in Jordan, which is ten million, with a 90% confidence level and a conservative 3% margin of error, approximately 1000 participants were needed. To ensure getting enough participants, the authors sent the study to 1500 participants using private messages for each participant on messenger, WhatsApp and other types of social media apps.

2.2. Instrument

The study instrument was titled Attitude of Parents Toward COVID-19 Vaccination for Children (APVC), and it was based on a previous research that used a comparable instrument to assess people's attitudes toward COVID-19 vaccination. [16]. This instrument assesses theoretical constructs such as the perception risk of contracting COVID-19, the severity of COVID-19, the benefits of the Vaccine against COVID-19, the obstacles to having received the Vaccine against COVID-19, identity, behavioral control, trust in the government, anticipated regret, understanding, and subjective norms. These items also evaluated participants' belief systems that vaccination would allow them to resume normal living and comply with social distancing, among other things. The study participants filled the questionnaires, rating their perception with statements that range from "strongly agree (1)" to "strongly disagree (5)." This instrument consists of 24 items. The score ranges from 24 to 120. The score ranges from 50 to 80 were considered moderate the participants were also asked if their school directed that child receive the Vaccine against COVID-19. The Cronbach alpha of the instrument was 0.87 [16]. This instrument was piloted for 20 parents to check for clarity and validity. It showed to be a valid instrument.

2.3. Ethical consideration

Jordan University of Science and Technology's Institutional Review

Board (IRB) approved the study for ethical reasons. The investigators assured the respondents who agreed to take part in the study that they had the right to withdraw at any time. All study participants received information about the study's purpose, risks, and benefits. Within the study setting, data were saved in a secluded location on laptop computers. Furthermore, participant information was treated with strict confidentiality, as names and any other information that could potentially expose a participant's identity were not included on the questionnaire survey. Helsinki Declaration has been followed for involving human subjects in the study.

2.4. Data collection

The collection of data was conducted through a survey distributed using google forms in October 2021. Further, the survey was advertised on different social media platforms, including Facebook and Twitter and other networks such as community organizations, academic posts, and private groups. The information on how to reach the authors was written in the advertisement. Parents who were interested in participating were sent an online consent form and survey on a private app to those who contacted the authors from. The study participants could only fill the questionnaires once on a computer or mobile phone with all data privacy and anonymity conditions provided upfront to all potential participants.

2.5. Data analysis

The Statal Package for Social Science (SPSS) 25 was used to analyze data from the survey (IBM Corporations). The researchers calculated the descriptive statistics to explain the demographic characteristics of the study participants. The authors used frequency and percentage for describing the response of participants for each statement of the attitude instrument of the 24 items that described the attitude toward vaccination. To determine the factors associated with attitude score, the General Linear Model Procedure was used. P value of less than 0.05 was considered significant.

3. Results

3.1. Demographic characteristics

The response rate was 1078 (71.8%). The participants were male 203 (18.8%) and female 875 (81.2%). Most of them are working full-time jobs 615 (57.1%) (Table 1).

3.2. Description of attitude of parents toward vaccination against COVID-19 for their own children

Table 2 shows parents' attitude toward COVID-19 vaccination for their children. The attitude of parents toward vaccination against COVID-19 for their own children was moderate demonstrated by the parents' responses. The mean of attitude score was 65 (SD = 8.4). Almost three quarters of parents (77.6%) disagreed that a COVID-19 vaccination should be mandatory for children. Almost 65% of the participants believe that if their child does not get a coronavirus vaccination and ends up getting coronavirus, they would regret not getting the vaccination (66.3%). Almost two thirds of parents disagreed that most people would allow their children to receive coronavirus vaccination (61.2%).

3.3. Determinants of parents' attitude

The GLM model was used to determine the predictors and correlates for the attitude score of parents toward COVID-19 vaccination for their children. The predictors that examine were gender, nationality, job status, level of income and if their child had previously received

Table 1
Demographic characteristics for the Participants(N = 1078).

		Frequency	Percent
Age	18 to 25	32	3.0
	26 to 35	351	32.6
	36 to 45	507	47.0
	46 to 55	164	15.2
	More than 55	24	2.2
Gender	Male	203	18.8
	Female	875	81.2
Health Insurance	No	268	24.9
	Yes	810	75.1
Children number	<3	290	26.9
	3	306	28.4
	>3	482	44.7
Working Status	No working	341	31.6
	Full work	615	57.1
	Partial work	80	7.4
	Retired	41	3.8
Income for month (1 JD = 1.4\$)	Less than 400	437	40.5
	400 to 600	429	39.8
	600 to 800	117	10.9
	More than 800	95	8.8
Education	Primary or secondary degree	6	0.6
	Less than diploma	193	17.9
	Associate	236	21.9
	Bachelor	499	46.3
	Higher degree	144	13.4
Social status	Married	1024	95.0
	Separated or widowed	54	5.0
Living Area	City	884	82.0
	Village	194	18.0
Smoking	NO	871	80.8
	YES	207	19.2
Number of times hearing news for COVID-19	Never	148	13.7
	Rarely	228	21.2
	Sometimes	279	25.9
	Always	423	39.2
Infected with viral infection related to respiratory system	No	325	30.1
	Yes	577	53.5
	Maybe	176	16.3
Getting Influenza vaccine	No	890	82.6
	Yes	161	14.9
	Maybe	27	2.5
Parent COVID Vaccine	No	210	19.5
	Yes	858	79.6
	Maybe	10	0.9

influenza vaccine. The study found that male, Jordanian, full-time workers, higher income, and having a child who had received the influenza vaccine previously were most likely to have a positive attitude toward COVID-19 vaccination for children. See [Table 3](#).

4. Discussion

The present study is the first to consider Jordanian parents' attitudes toward COVID-19 vaccination for their own children during the COVID-19 disease outbreak. Furthermore, it is the first study to provide parents with reference information for the ongoing vaccine hesitancy with COVID-19 in their children. Also, this study demonstrated important factors that influence parents' attitude toward COVID-19 vaccination for their children, such as socio-demographic characteristics and other factors.

This study reveals a moderately positive attitude among parents toward COVID-19 vaccination for their own children. In comparison, a study in Turkey found a high rejection of parents toward COVID-19 vaccination under any circumstances [17]. Other results of previous studies regarding attitude of parents toward COVID-19 vaccination for their children were different 89% in England [18], 80% in New Zealand [19], 72.5% in China [20], 65.2% in the USA,21 According to some participants in our study 511 (47.4%) that COVID-19 vaccination may

cause children to infect with COVID-19. More than third of the participants 411 (38.1%) said they know enough about the coronavirus illness to make an informed decision about whether to give the vaccine to my child". In comparison, a Turkish study found that many parents preferred to use other measures such as social distancing rather than vaccination. 17 Almost 50% are concerned about the vaccine?? Safety compared to previous studies [20,21]. More than 30% believe that children are not at risk from viruses compared to other groups and have no need for vaccination (citation?). A study in China revealed elevated levels of COVID-19 vaccination acceptance among the adult population during the pandemic [22]. According to most participants (91.3%), they would receive the Vaccine against COVID-19 it was made available after successful development and approval. More than half of the participants (52.2%) in the group that would accept the vaccine wanted to receive the vaccine as soon as it was made available, while 47.7% of them would wait until the vaccine's safety was confirmed [22].

Our study found that the attitude of parents toward COVID-19 vaccination for their own children was more likely to be significant and impacted by gender, nationality, job status, level of income and if their child had previously received influenza vaccine. In comparison to the Turkish study, the only factor correlated with parents' attitude toward COVID-19 vaccination was working as a healthcare provider. A study found that older parents, male gender, higher income, and higher education were more likely to show a positive attitude toward COVID-19 vaccination for their children compared to other parents [23]. A study in Italy found that low income with lower education level was a major determinant of negative attitude toward COVID-19 vaccination for children [24]. Another study found that crucial factors influencing the vaccination of the participants who accepted vaccination included risk perception, the belief of the vaccine efficacy, marital status, value for doctor's recommendations, gender, influence vaccination history, vaccine price or convenience [25,26]. In China, the acceptance of the vaccine against COVID-19 was higher than our study. This shows a difference in public perception about the COVID-19 pandemic considering the risk of infection, the vaccine's attitude or importance, the severity of the disease, and macro-level factors such as cultural or social factors across countries [27–30].

The pandemic has had a significant impact on many life aspects among many nations, and in particular, persons in China [31]. However, China implemented many restricted measures to control COVID-19 transmission and these interventions played a significant role in the control of COVID-19 transmission. The China study showed that very few of the study participants (12.2%) perceived an elevated risk of contracting COVID-19 despite 74.7% of them reporting confirmed or suspected cases in the countries in which they live (citation here?). In contrast, a study in China found a firm belief of Vaccine against COVID-19 efficacy among residents compared to 89.5% who perceived vaccination as the most effective way for COVID-19 prevention and control even when the vaccine was still under development [32,33].

(In our study?) The attitude of parents toward vaccination against COVID-19 for their own children was moderate. In comparison, a study of adult people in China found a significant positive attitude toward COVID-19 vaccination, and the effect of the pandemic on life helps explain the optimistic response toward COVID-19 vaccination. They believe that the benefits of vaccination outweigh the risks [31].

The findings for our study provide a starting point regarding the children's vaccination to establish public immunity of Jordanian population. As a result, the rapid development of the Vaccine against COVID-19 for children is a recommended response to the pandemic. Although the study observed elevated levels of acceptance, there are barriers to increasing the uptake of the vaccine. The behavior of parents is related to the uncertainty of concerns about the safety of the vaccine hence vaccine hesitation.

A study observed a delay in vaccination due to two fundamental reasons. First, the Vaccine against COVID-19 was still under investigation for use for children, and there was little to no information about the

Table 2
Description of Attitude of parents toward vaccination against COVID-19 for own children(N = 1078).

	Strongly Disagree		Slightly Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
1. A COVID-19 vaccination for the children should be mandatory	501	46.1%	344	31.6%	126	11.6%	107	9.8%	9	0.8%
2. Without COVID-19 vaccination for the children, children will catch coronavirus	267	24.6%	301	27.7%	282	25.9%	217	20.0%	20	1.8%
3. If a child gets a COVID-19 vaccination, the child will be protected against coronavirus.	306	28.2%	352	32.4%	262	24.1%	156	14.4%	11	1.0%
4. If child do not get a coronavirus vaccination and end up getting coronavirus, child would regret not getting the vaccination*	340	31.3%	382	35.1%	205	18.9%	145	13.3%	15	1.4%
5. It would be extremely easy for a child to have a COVID-19 vaccination	276	25.4%	261	24.0%	259	23.8%	265	24.4%	26	2.4%
6. A coronavirus vaccination for children could give them coronavirus	28	2.6%	203	18.7%	339	31.2%	280	25.8%	237	21.8%
7. I would be worried about my child experiencing side effects from COVID-19 vaccination.	150	13.8%	454	41.8%	157	14.4%	126	11.6%	200	18.4%
8. I might regret getting a COVID-19 vaccination for the child if the child later experienced side effects from the vaccination	203	18.7%	140	12.9%	160	14.7%	431	39.7%	153	14.1%
9. A COVID-19 vaccination for the child will be too new for parents to be confident about it	184	16.9%	172	15.8%	204	18.8%	391	36.0%	136	12.5%
10. Most people will allow their children to receive coronavirus vaccination.	335	30.8%	330	30.4%	265	24.4%	139	12.8%	18	1.7%
11. Other people like me will not allow their children to give a coronavirus vaccination	110	10.1%	385	35.4%	244	22.4%	174	16.0%	174	16.0%
12. In general, vaccination is a good thing*	221	20.3%	223	20.5%	293	27.0%	295	27.1%	55	5.1%
13. My child afraid of needles*	124	11.4%	449	41.3%	207	19.0%	150	13.8%	157	14.4%
14. If children were vaccinated, children would not need to follow social distancing and other restrictions for coronavirus	340	31.3%	323	29.7%	235	21.6%	161	14.8%	28	2.6%
15. I know enough about the coronavirus illness to make an informed decision about whether to give vaccine for my child	153	14.1%	202	18.6%	319	29.3%	335	30.8%	78	7.2%
16. I know enough about the coronavirus vaccine to make an informed decision about whether to give the vaccine to my child.	159	14.6%	226	20.8%	293	27.0%	331	30.5%	78	7.2%
17. Only children who are at risk of serious illness from coronavirus need to be vaccinated	255	23.5%	290	26.7%	273	25.1%	233	21.4%	36	3.3%
18. My family would approve of my child getting a coronavirus vaccination.	393	36.2%	294	27.0%	217	20.0%	153	14.1%	30	2.8%
19. My friends would approve of giving coronavirus vaccination for my child	358	32.9%	310	28.5%	284	26.1%	119	10.9%	16	1.5%
20. If a COVID-19 vaccination for the children was recommended by the Government, children would get vaccinated	336	30.9%	264	24.3%	243	22.4%	217	20.0%	27	2.5%
21. If a COVID-19 vaccination for my child was recommended by a healthcare professional, my child would get vaccinated*	325	29.9%	255	23.5%	237	21.8%	237	21.8%	33	3.0%
22. Widespread COVID-19 vaccination for the children is just a way to make money for vaccine manufacturers*	111	10.2%	300	27.6%	306	28.2%	220	20.2%	150	13.8%
23. A coronavirus vaccine for children will allow us to give back to 'normal'	275	25.3%	287	26.4%	304	28.0%	192	17.7%	29	2.7%
24. There would be no point in having the COVID-19 vaccination for the child unless child could go back to my normal life	171	15.7%	178	16.4%	264	24.3%	367	33.8%	107	9.8%

safety of the vaccines to refer to the children until now. Second, the concern about new vaccines during the pandemic differed from those routinely used. Due to the uncertainties, the emergence of a new infectious disease and concerns could be perceived as political [34]. Our study reported that many parents believe that widespread COVID-19 vaccination for their children are just a way to make money for vaccine manufacturers (34%). In comparison, a quantitative study in Dutch reported a similar finding. After introducing a safe vaccine comparable to those already available in the market, the factor in deciding to receive the vaccine becomes less important than other factors such as the cost or effectiveness of the vaccine [35].

Our study also evaluated the impact of socio-demographic factors on vaccine acceptance. It revealed that male or unmarried respondents from the Chinese population had higher vaccine acceptance of immediate vaccination. The study also revealed that the income and education of the respondents did not have any influence on the intentions. In another study that used multiple regression to determine predictors for attitude toward vaccination for adult were found that female, having children in home, independent, not worry about having COVID-19 more acceptable for vaccination against COVID-19 than high income or people with higher degrees [36].

This study was able to explore the barriers and promoters of

vaccination that are important in determining priority groups that require special attention during vaccination campaigns. They are also important in designing an effective immunization strategy that focuses on increasing vaccine uptake to control and prevent the spread of the COVID-19 virus.

4.1. Limitations

There are many limitations for this study such as using self-reported instruments. However, the authors used a large size to decrease the bias. Another limitation, using cross-sectional design which limits the cause-effect relationship. Also, the authors used social media to distribute since the COVID-19 virus limited distribution by using paper-pencil, however, this was the best way to collect the data from the participants.

4.2. Implication of the study

The findings will be useful in implementing effective vaccination programs and initiatives for families and children who are already hesitant. First, Jordan needs to make the vaccine affordable for the public and promised to make it globally available when ready for use. Second, measures to enhance the accessibility and convenience of the

Table 3
Attitude of Parents toward COVID-19 and other Characteristics of the participants

	Mean	95% Confidence Interval	p-value
Age			0.117
18 to 25	72.7	64.9 80.4	
26 to 35	70.4	63.8 76.9	
36 to 45	69.3	62.6 75.9	
46 to 55	70.5	63.7 77.3	
more than 55	74.9	67.0 82.9	
Gender			0.012
male	72.9	66.3 79.5	
female	70.2	63.4 76.9	
Nationality			0.013
Jordanian	68.7	62.5 75.0	
others	74.3	66.8 81.9	
Health Insurance			0.158
NO	70.8	64.2 77.4	
YES	72.3	65.6 79.0	
Children number			0.153
<3	70.7	64.0 77.3	
3	71.5	64.7 78.2	
>3	72.5	65.9 79.1	
What the status of your job			0.028
No working	73.0	68.3 77.6	
Full work	69.9	65.3 74.4	
Partial work	69.1	64.0 74.2	
Retired	69.4	63.6 75.2	
What is the level of your income?			0.000
less than 400	67.8	61.3 74.3	
400 to 600	70.9	64.4 77.5	
600 to 800	73.6	66.7 80.6	
more than 800	73.8	66.7 80.9	
Level of Study			0.576
illiterate	78.3	66.9 89.7	
Primary or Secondary	69.8	63.3 76.3	
Associate	69.9	63.3 76.5	
Bachelor	69.9	63.4 76.3	
Higher degree	69.9	63.3 76.5	
What is your social status?			0.322
Married	70.7	64.3 77.1	
Separated	72.4	65.3 79.5	
Where do you live?			0.864
city	71.6	65.1 78.1	
village	71.5	64.7 78.2	
Do you smoke?			0.959
NO	71.6	65.0 78.2	
YES	71.5	64.8 78.2	
Did your child infected with viral disease			0.269
NO	71.0	64.4 77.5	
YES	72.1	65.4 78.8	
How many times do you hear the news?			0.421
Never	70.6	63.8 77.3	
Rarely	71.2	64.6 77.9	
Sometimes	72.0	65.3 78.8	
Always	72.3	65.7 79.0	
Was your child infected with viral disease?			0.436
No	70.8	64.3 77.4	
Yes	71.9	65.2 78.5	
Maybe	71.9	65.2 78.7	
Did your child receive the influenza vaccine?			0.001
No	68.9	62.4 75.4	
Yes	72.6	66.0 79.3	
Maybe	73.1	65.4 80.8	
Did you receive COVID-19 vaccination			0.004
No	71.8	65.5 78.1	
Yes	74.7	68.6 80.8	
Maybe	68.1	58.5 77.7	

vaccine in terms of its production, distribution, supply, and immunization should be taken. Finally, information about the vaccine's safety should be regularly monitored and conveyed to the public. This should be done following vaccination and immediate health education available by reliable sources such as healthcare professionals.

5. Conclusion

This is a major national study in Jordan on Vaccine against COVID-19 hesitancy among parents for their children. According to the findings of this study, more than half of parents were reluctant to allow their own children to receive the COVID-19 vaccination. Discrepancies in vaccine hesitancy were found to be influenced by a variety of factors, including gender, nationality, work status, income level, and whether their child had received multiple influenza vaccines. Along with predictors were determined in this project many other factors will impact the increased rate of getting vaccine against COVID-19s for children.

Ethical approval

Jordan University of Science and Technology's Institutional Review Board (IRB) approved the study for ethical reasons. All study participants received information about the study's purpose, risks, and benefits. The Helsinki Declaration has been followed for involving human subjects in the study. This study was approved from Jordan University of Science and Technology.

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Author contributions

All authors had a significant contribution to this paper.

Availability of data

Available upon request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

- [1] World Health Organization. WHO SAGE roadmap for prioritizing uses of Vaccine against COVID-19s in the context of limited supply: an approach to inform planning and subsequent recommendations based on epidemiological setting and vaccine supply scenarios, first issued 20 October 2020, latest update 16 July 2021. World Health Organization; 2021.
- [2] Alrabadi NB, Melhem S, Alzoubi K, et al. COVID-19 vaccination hesitancy: a review of the literature and recommendations. *Curr Rev Clin Exp Pharmacol* 2022;22(10).
- [3] Abuhammad S. Parents' knowledge and attitude towards COVID-19 in children: a Jordanian Study. *Int J Clin Pract* 2021 Feb;75(2):e13671.
- [4] Goldman RD, Staubli G, Cotanda CP, et al. Factors associated with parents' willingness to enroll their children in trials for COVID-19 vaccination. *Hum Vaccines Immunother* 2020;17:1607–11.
- [5] Committee on Infectious Diseases. Vaccine against COVID-19s in children and adolescents. *Pediatrics* 2021;148(2):e2021052336. <https://doi.org/10.1542/peds.2021-052336>.
- [6] Khan MT, Islam MJ, Parihar A, Islam R, Jerin TJ, Dhote R, Ali MA, Laura FK, Halim MA. Immunoinformatics and molecular modeling approach to design universal multi-epitope vaccine for SARS-CoV-2. *Inform Med Unlocked* 2021 Jan 1; 24:100578.
- [7] Parihar A, Sonia ZF, Akter F, Ali MA, Hakim FT, Hossain MS. Phytochemicals-based targeting RdRp and main protease of SARS-CoV-2 using docking and steered molecular dynamic simulation: a promising therapeutic approach for Tackling COVID-19. *Comput Biol Med* 2022 Jun 1;145:105468.
- [8] <https://ourworldindata.org/grapher/covid-fully-vaccinated-by-age?country=~FRA>. Accessed August 24, 2021.
- [9] <https://www.mayoclinic.org/coronavirus-covid-19/vaccine-tracker>. Accessed August 24, 2021.
- [10] Ioannidis JP. COVID-19 vaccination in children and university students. *Eur J Clin Invest* 2021 Sep;16:e13678.

- [11] Lavine JS, Bjornstad O, Anthia R. Vaccinating children against SARS-CoV-2. *BMJ* 2021;373:n1197.
- [12] Ioannidis JPA. Benefit of COVID-19 vaccination accounting for potential risk compensation. *NPJ Vaccines* 2021;6:99.
- [13] Klass P, Ratner AJ. Vaccinating children against covid-19 - the lessons of measles. *N Engl J Med* 2021;384:589–91.
- [14] Ward JK, Alleaume C, Peretti-Watel P, et al Group C. The French public's attitudes to a future Vaccine against COVID-19: the politicization of a public health issue. *Soc Sci Med* 2020;265:113414.
- [15] Thunstrom L, Ashworth M, Finnoff D, Newbold S. Hesitancy towards a Vaccine against COVID-19 and prospects for herd immunity. *SSRN Electron J* 2020:1–51. <https://doi.org/10.2139/ssrn.3593098>.
- [16] Sherman SM, Smith LE, Sim J, Amlot R, Cutts M, Dasch H, Rubin GJ, Sevdalis N. COVID-19 vaccination intention in the UK: results from the COVID-19 vaccination acceptability study (CoVaccS), a nationally representative cross-sectional survey. *Hum Vaccines Immunother* 2021 Jun 3;17(6):1612–21.
- [17] Yilmaz M, Sahin MK. Parents' willingness and attitudes concerning the COVID-19 vaccine: a cross-sectional study. *Int J Clin Pract* 2021 May;16:e14364.
- [18] Bell S, Clarke R, Mounier- Jack S, Walker JL, Paterson P. Parents' and guardians' views on the acceptability of a future COVID-19 vaccine: a multi-methods study in England. *Vaccine* 2020;38:7789–98.
- [19] Jeffs E, Lucas N, Walls T. CoVID-19: parent and caregiver concerns about reopening New Zealand schools. *J Paediatr Child Health* 2021;57:403–8.
- [20] Zhang KC, Fang Y, Cao HE, et al. Parental acceptability of COVID-19 vaccination for children under the age of 18 years: cross-sectional online survey. *JMIR Ped Par* 2020;3:e24827.
- [21] Goldman RD, Yan TD, Seiler M, et al. Caregiver willingness to vaccinate their children against COVID-19: cross sectional survey. *Vaccine* 2020;38:7668–73.
- [22] Wang J, Jing R, Lai X, Zhang H, Lyu Y, Knoll MD, Fang H. Acceptance of COVID-19 vaccination during the COVID-19 pandemic in China. *Vaccines* 2020 Sep;8(3):482.
- [23] Davis MM, Zickafoose JS, Halvorson AE, Parents' Psw. Likelihood to vaccinate their children and themselves against COVID-19. *medRxiv*; 2020. p. 1–9. <https://doi.org/10.1101/2020.11.10.20228759v1>.
- [24] Bertonecello C, Ferro A, Fonzo M, et al. Socioeconomic determinants in vaccine hesitancy and vaccine refusal in Italy, vol. 8. Basel: Vaccines; 2020. p. 276.
- [25] Determann D, Korfage LJ, Lambooj MS, Bliemer M, Richardus JH, Steyerberg EW, De Bekker-Grob EW. Acceptance of vaccinations in pandemic outbreaks: a discrete choice experiment. *PLoS One* 2014;9:e102505.
- [26] Wang Q, Yue N, Zheng M, Wang D, Duan C, Yu X, Zhang X, Bao C, Jin H. Influenza vaccination coverage of population and the factors influencing influenza vaccination in mainland China: a meta-analysis. *Vaccine* 2018;36:7262–9.
- [27] Nguyen T, Henningsen KH, Brehaut JC, Hoe E, Wilson K. Acceptance of a pandemic influenza vaccine: a systematic review of surveys of the public. *Infect Drug Resist* 2011;4:197–207.
- [28] Yaqub O, Castle-Clarke S, Sevdalis N, Chataway J. Attitudes to vaccination: a critical review. *Soc Sci Med* 2014;112:1–11.
- [29] Dubé E, MacDonald NE. Vaccine acceptance: barriers, perceived risks, benefits, and irrational beliefs. In: Bloom BR, Lambert P, editors. *The vaccine book*. second ed. Cambridge, MA, USA: Academic Press; 2016. p. 507–52 [Chapter 26].
- [30] Abuhammad S. Attitude of pregnant and lactating women toward COVID-19 vaccination in Jordan: a cross-sectional study. *J Perinat Med* 2022;22(4).
- [31] Rubin GJ, Potts H, Michie S. The impact of communications about swine flu (influenza A H1N1v) on public responses to the outbreak: results from 36 national telephone surveys in the UK. *Health Technol Assess* 2010;14.
- [32] Seale H, Heywood AE, McLaws M, Ward KF, Lowbridge CP, Van D, MacIntyre CR. Why do I need it? I am not at risk! Public perceptions towards the pandemic (H1N1) 2009 vaccine. *BMC Infect Dis* 2010;10:99.
- [33] Eastwood K, Durrheim DN, Jones A, Butler M. Acceptance of pandemic (H1N1) 2009 influenza vaccination by the Australian public. *Med J Aust* 2010;192:33–6.
- [34] Larson HJ, Jarrett C, Eckersberger E, Smith DMD, Paterson P. Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: a systematic review of published literature. *Vaccine* 2014;32:2150–9.
- [35] Sanders JG, Spruijt P, van Dijk M, Elberse J, Lambooj MS, Kroese FM, de Bruin M. Understanding a national increase in COVID-19 vaccination intention, The Netherlands, November 2020–March 2021. *Euro Surveill* 2021 Sep 9;26(36):2100792.
- [36] Khubchandani J, Sharma S, Price JH, Wiblishauser MJ, Sharma M, Webb FJ. COVID-19 vaccination hesitancy in the United States: a rapid national assessment. *J Com Hea* 2021 Apr;46(2):270–7.