



Jordan Journal of Nursing Research

Journal homepage: <https://jjnr.just.edu.jo/jjnr/>



Factors Predicting the Willingness of Parents to Have Their Children Vaccinated against COVID-19 Pandemic: A Cross-sectional Survey in Jordan

Reem Ahmad Ali, RN, PhD^{1*}

¹ Associate Professor, Department of Maternal and Child Health Nursing, Faculty of Nursing, Jordan University of Science and Technology, Irbid, Jordan. * Corresponding Author: Email: raali@just.edu.jo

ARTICLE INFO

Article History:

Received: June 14, 2022

Accepted: October 9, 2022

ABSTRACT

Background: COVID-19 vaccination has proven to be effective in controlling the spread of the pandemic. However, many parents remain unwilling to have their children vaccinated. **Purpose:** This study aims to investigate the willingness on the part of Jordanian parents to have their children receive COVID-19 vaccines and to examine the predictors of this parental willingness. These predictors/variables include parents' demographic variables, risk perception and trust in health authorities and healthcare professionals. **Methods:** In September 2020, an online survey was used to generate a sample made up of parents residing in every region of the country using a proportional cluster protocol. A self-reporting questionnaire was used to generate the data. **Results:** A total of 1,252 parents participated in this study. Analysis revealed that 25.5% of the parents were willing to have their children vaccinated and that 25%, approximately, trusted what the health authorities had to say about the pandemic. 31.4% trusted healthcare professionals for caring for COVID-19 infected people. Finally, the results of the study showed that parental risk perception, trust, gender and education were the significant predictors of the parents' willingness to have their children vaccinated. **Conclusion:** Among Jordanian parents, the high prevalence of opposition to children vaccination may be explained by factors, such as risk perception of COVID-19, trust in health authorities and healthcare professionals and demographics. **Implications for Nursing:** Health-promotion initiatives are needed to provide parents with clear, accurate and transparent information about the possible risks of COVID-19 infection among children and the vaccine's benefits for both children and communities.

Keywords: Covid-19 pandemic, Vaccination, Parents' willingness, Children, Jordan.

What does this paper add?

1. The study shows that only around 25.5% of Jordanian parents were willing to have their children vaccinated against COVID-19.
2. Parental willingness to have their children vaccinated against COVID-19 varies with their educational level, gender, trust in health authorities and level of perceived risk.
3. Health-care providers need to provide parents with

updated and transparent information about the possible risks of COVID-19 infection among children and the vaccine's benefits for both children and communities.

Introduction

In 2019, people across the globe were alarmed and distressed by news of the outbreak of the novel coronavirus SARS-CoV-2 (COVID-19). First reported

in Wuhan, China, the contagion spread rapidly across the globe, acquiring the WHO designation of a pandemic. By December 2021, the number of infected cases worldwide stood at 289 millions, while the death toll climbed to 5.44 million people. In Jordan, more than 10% of the population was infected and the number of deaths exceeded 12 thousand cases (Our World in Data, 2021). Compared to other coronavirus strains, such as MERS and SARS, the novel coronavirus is a highly contagious respiratory infection to which whole populations are susceptible (WHO, 2021). Infections among children are mostly mild or asymptomatic (Lu et al., 2020; Su et al., 2020; Xu et al., 2020). However, infants and children with underlying conditions, such as asthma and cardiovascular disease, are at greater risk of severe or critical complications (Dong et al., 2020). A systematic review of 131 studies pertaining to COVID-19 infection among 7780 pediatric patients across 26 countries indicated that the most common clinical manifestations are fever, cough, fatigue and abdominal pain (Hoang et al., 2020). Accumulative evidence showed a sub-set of COVID-19-infected children with certain medical conditions, such as respiratory and cardiac history -developed co-infection, severe inflammation with persistent fever, shock and multi-organ failure (Hoang et al., 2020; WHO, 2022).

In response to the COVID-19 pandemic, drastic measures were implemented all across the globe to reduce the spread of infection. These included quarantines, lockdowns, border closures, curfews, social distancing and the wearing of masks. The impact on national economies was severe, as supply chains dried up and many businesses were forced to close. In Jordan, many struggled to access basic services, including healthcare and to meet basic needs (UNDP, 2020). Moreover, numerous reports talked about children experiencing stress due to social isolation, online schooling and family illness (Patrick et al., 2020). Success in reducing the number of COVID-19 cases depends on the willingness of the adult population to adhere to protective measures and to get vaccinated. Referring to WHO (2022) reports which are based on the available scientific evidence, the favorable safety outcomes of COVID-19 vaccines outweighed the undesirable consequences among children, in which vaccines provide additional protection to the children's immunity system and are well-tolerated with no serious adverse effects among children (WHO, 2022). Also,

evidence showed that COVID-19 vaccine reduces the severity of disease manifestation, which ultimately decreases hospital admissions among children (Yan et al., 2021).

Pediatrics represent 44.3% of Jordan's population (Department of Statistics, 2020). Thus, vaccinating this demographic group is essential to the protection of every community. A COVID-19 vaccination campaign, initiated in January 2021, targeted the elderly and other vulnerable groups. By December 2021, 38% of the population had received two doses, which is significantly lower than the worldwide average of 48.3% (Our World in Data, 2021). Reluctance on the part of adults to be and have their children vaccinated against COVID-19 is of high concern worldwide (Dube et al., 2021; Skjefte et al., 2021). An international survey that was conducted in 2020 across 16 countries indicated that mothers' acceptance to have their children vaccinated against COVID-19 geographically varied, in which the acceptance levels in Colombia, India, Brazil and Mexico were more than 85%, while in the United States of America, Australia and Russia, the acceptance levels were below 52% (Skjefte et al., 2021). Furthermore, in Saudi Arabia, a neighboring Arab country, one study revealed that 24% of mothers intended to have COVID-19 vaccine given to their children (Aldakhil et al., 2021), while another study showed that slightly less than a half of parents decided to have their children vaccinated (Temsah et al., 2021). In Jordan, in 2020, a cross-sectional survey indicated that the majority of general population prefer a more natural way to develop immunity against corona-virus infection, as more than two thirds of the surveyed people have serious concerns about the side effects of COVID-19 vaccine (Abu Farha et al., 2021). Furthermore, another survey in Jordan revealed a fairly low (37.4%) public acceptance of COVID-19 vaccine (El-Elimat et al., 2021). When conducting the current study, knowledge regarding parental willingness to have their children vaccinated was lacking among Jordanians. As COVID-19 vaccines for children are currently available, it is important to learn about parental willingness to immunize them, in particular about the factors that inform parental decision-making in this regard.

Adherence to preventive health practices, such as vaccination, varies among individuals owing to differences in various factors, including risk perception. The latter is a trigger factor for engaging in prevention

behaviors (Lee et al., 2016). Moreover, trust in health authorities has been found to influence people's decisions and behaviors when responding to environmental pressures (Cori et al., 2020). Due to the novelty of COVID-19, there exists no information about the determinants of parental willingness to have their children vaccinated and due to inconclusive pertained evidence, it is of great importance to evaluate the parental perspective within the context of Jordan in this regard. It is for this reason that this study aims to investigate parental willingness to have their children vaccinated against COVID-19 and the determinants of this willingness. Potential determinants include parental perceived risk of COVID-19 infection, trust in health authorities and healthcare professionals, the overall health of their children and parental demographics.

Methodology

Study Design and Sample Size

A cross-sectional online-survey design study was conducted to generate a convenient sample made up of parents residing across all regions in the country using a proportional cluster protocol. Given that the study population (parents with children under the age of 18 years) is more than 20,000 parents, the minimum required sample size is 380, with a margin of error of 5% and a confidence level of 95% (CheckMarket, 2020). Referring to the current literature pertaining to online surveys, the response rates are estimated to be between 30% and 44% (Poynton et al., 2019). Accounting for possible incomplete responses, for this study, more than 1500 potential participants were targeted. A self-reporting questionnaire was used to generate the data. Given that most Jordanians own smartphones, the inclusion criteria were minimal: all that what was required was that the parents own a smartphone, be fluent in Arabic and aged ≥ 18 years. Finally, one parent was permitted to fill the questionnaire.

Measurements

The main study outcome variables are: (1) parental willingness to have their children vaccinated against COVID-19, (2) parental perceived risk of COVID-19 and (3) parental trust in health authorities and healthcare professionals. The survey questionnaire gathered a broad range of variables including demographic characteristics and parents' evaluation of their children's health. To ensure research quality standards,

STROBE checklist is used in this study.

Study scales were developed based on an extensive literature review. The study questionnaire was initially developed in English and translated into Arabic. The bilingual questionnaire was reviewed by a panel of experts for content validity. The final adopted questionnaire in Arabic was back-translated into English, which assured that both questionnaire versions are comparable.

Parental willingness to have their children inoculated with the COVID-19 vaccine when it became available was assessed using a 7-point Likert scale ranging from "strongly unwilling" (1) to "strongly willing" (7).

The parental perceived risk variable was measured using a 7-item scale, which was developed by the researcher based on the literature relating to severe acute respiratory syndrome and novel influenza (Kim et al., 2016; Leung et al., 2005; Liao et al., 2010). The scale items tapped into the parents' concerns about the severity of COVID-19 compared to other infectious diseases, the danger it posed to them, their children and humanity in general and concerns about contracting the infection. Responses to items ranged from "strongly disagree" (1) to "strongly agree" (7). An average score was obtained for the perceived risk variable. Test of Cronbach's alpha (0.91) indicated an excellent internal reliability for this scale.

The variable parental trust in health authorities and healthcare professionals was measured using four items: example item "I trust what the health authorities say about COVID-19". Scale responses ranged from "strongly disagree" (1) to strongly agree" (7). An average score was obtained for parental trust. Cronbach's alpha for the trust scale was 0.80.

Given that the levels of agreement for both parental perceived risk and trust variables are anchored between 1 (strongly disagree), 4 (neutral) and 7 (strongly agree), an average score of three and less is deemed to be low, a score more than three and less than five is moderate and a score of five or more is considered high.

The parents were also asked to rate their children's health on an 11-point Likert scale, ranging from "extremely poor" (0) to "excellent health" (10). Parental demographics for this study included age, education, family income and employment.

To test for clarity and readability, we piloted the study questionnaire on social media (Facebook), with 50 participants making up the sample. The results were all

positive: no modifications were required for the main study variable scales, the questions were clear and the average time required to complete the questionnaire was 8 minutes. The only modification made was for categorizing the family income, because the majority of pilot responses indicated family incomes below 500 (JD) which initially was the starting category. Taking into consideration the global and domestic recession inflicted by COVID-19 pandemic and ultimately the severe decline in family income among Jordanians (UNDP, 2020), family-income categories started close to absolute poverty which was 350 JD (The Earth Institute of Columbia University, 2012), followed by categories tapping on income below and above the poverty line, then came the category addressing average family incomes between 800 and 1199 JD (Department of Statistics, 2017) and the last category was above that average. Responses obtained by the pilot study were excluded from the study sample.

Data Collection

The online survey was conducted using SurveyMonkey to generate a convenient sample made up of parents residing in Jordan. The self-reporting questionnaire was created on the SurveyMonkey and linked to the Facebook to solicit parents' responses. An advertising Facebook campaign was designed to target participants with a specific demographic profile including age ≥ 18 years and Facebook address to proportionally distributing the advertising messages. Based on the population's geographical distribution in Jordan, the sample comprised 60% from middle Jordan, 30% from north Jordan and 10% from the south in order to represent the whole population of Jordan.

The survey was conducted in the third and fourth weeks of September 2020, which was six months after the WHO declaration of the COVID-19 pandemic and immediately before the beginning of the state vaccination campaign we know.

Ethical Considerations

The study protocol, which was designed to conform to the principles of the Declaration of Helsinki, was reviewed and approved by the relevant institutional review board (ref/44/134/2020).

A prologue that included information about study

aims, benefits and risks was provided for potential participants. Participation in the study was voluntary and there were no incentives for completing the survey. Also, a statement about the anonymity of data collection and analysis was included. Then, potential participants were asked to agree or disagree to an electronic informed consent by presenting a statement "if you would like to participate in this study, please click continue to complete the online survey and if you wish to decline or one parent has already filled the survey, just click discontinue".

Analysis

The Statistical Package for Social Sciences (SPSS), version 26 was used to analyze the data. Descriptive statistics, including frequencies and means, were generated for all the variables. Given that the study aimed at examining the predictors of parental willingness to have their children receive the COVID-19 vaccine, regression analysis was used. The significance level was set at ≤ 0.05 .

Results

The total number of obtained responses was 1412; of them, 160 responses were excluded due to severely incomplete data. The dataset comprised a total of 1,252 responses. Table 1 lists the demographic characteristics of the sample. The respondents' ages ranged from 19 to 66 years (mean = 40.1, SD $\pm$ 7.89), while the majority were mothers (81.4%) and married (96.9%). More than a half of them had university education (61.0%) and less than a half of them were unemployed. 72.1% resided in urban areas and 56% reported an average family income of less than 600 JD (845.00 \$US). Moreover, 80% rated their children's health between 8 and 10 on the Likert scale, indicating a high level of health

Parental Willingness to Have Children Vaccinated

25.5% of the respondents were either willing or strongly willing to have their children vaccinated as soon as vaccines were available. Univariate analysis of the willing to have children vaccinated variable revealed a violation of the normality assumption and for this reason, this variable was converted into a dichotomy variable (willingness vs. unwillingness) for further analysis.

Table 1. Sample demographics

Variables	N (%)	Total N	95% CI	
			Lower Bound	Upper Bound
Parent (Mother)	1019 (81.4 %)	1252	0.79	0.83
Marital status (Married)	1213 (96.9 %)	1252	0.96	0.98
Parent age in years (mean (SD))	40.1 (7.89)			
Employment		1252	0.80	0.85
Unemployed	592 (47.3 %)		0.45	0.50
Employed	534 (42.7 %)		0.40	0.45
Employed in healthcare sector	126 (10.1 %)		0.09	0.12
Parent education (degree)		1252		
Primary/secondary school	258 (20.6 %)		0.18	0.23
Diploma	231 (18.5 %)		0.16	0.21
Bachelor's degree	578 (46.2 %)		0.43	0.49
Higher education	185 (14.8 %)		0.13	0.17
Family monthly income * (Jordanian Dinars)		1133		
≤ 350	324 (28.6 %)		0.26	0.31
351-599	313 (27.6 %)		0.25	0.30
600-799	190 (16.8 %)		0.15	0.19
800-1199	176 (15.5 %)		0.14	0.18
≥ 1200	130 (11.5 %)		0.10	0.13
Area of residency		1252		
Urban	903 (72.1 %)		0.70	0.75
Rural	349 (27.9 %)		0.25	0.30

* 1\$ = (JD 0.71).

Parents' Perceived Risk

The mean score for the perceived risk variable was 4.64 ($SD= 1.37$), indicating a moderate risk perception of COVID-19. Table 2 summarizes the agree and strongly agree response frequencies for the perceived-risk scale items. Descriptive analysis revealed that 61.9% of the respondents were concerned that their

children might contract the corona infection (i.e., endorsed ≥ 6 on item 5) and 27.6% believed that if infected, their children would become seriously ill (i.e., endorsed ≥ 6 on item 7). Moreover, less than a half of the respondents perceived the coronavirus to be a serious threat.

Table 2. Parental perceived risk of COVID-19 and trust in health authorities & healthcare professionals

No.	Scale items	Agree & strongly agree frequency (%)
Perceived Risk Scale Items		
1	Compared to other infectious diseases, COVID-19 is the most dangerous one nowadays.	507 (40.5%)
2	COVID-19 is a serious threat to me and my children.	533 (42.6%)
3	COVID-19 is a serious risk that threatens the survival of humans.	280(22.3%)
4	I feel worried that I may be infected with COVID-19.	550 (43.9%)
5	I feel worried that my children may be infected with COVID-19.	776 (61.9%)
6	If I were infected with COVID-19, I would be seriously ill.	333 (26.6%)
7	If my children were infected with COVID-19, they would be seriously ill.	346(27.6%)
Parental Trust in Health Authorities Scale Items		
1	I trust that health authorities have taken adequate actions to protect children from COVID-19 from the beginning of the outbreak of coronavirus.	600 (51.1%)
2	I trust what the health authorities say about COVID-19.	327 (27.9%)
3	I trust that health authorities will take adequate actions to control COVID-19 when children go back to school.	189 (16.2%)
4	I trust health authorities and healthcare professionals in treating infected people with COVID-19.	368 (31.4%)

Trust

The average mean score for the trust variable was 4.17 ($SD=1.47$), indicating a moderate level of trust. As shown in Table 2, more than a half (51.1%) of the parents agreed, or strongly agreed that the health authorities had taken adequate actions to protect children from coronaviruses during the second and third quarter of 2020. Only 27.9% of the parents trusted health authorities' statements about the corona pandemic and only 31.4% trusted healthcare professionals in caring for those infected.

Predictors of Parental Willingness to Have Their Children Vaccinated

Possible predictors of willingness to have children vaccinated were examined using binary logistic regression. Only the variables that showed significant correlations with willingness to have children vaccinated were included in the regression model. Children's general health, parental age, family income and type of parental employment proved to be unrelated

to parental willingness. This left parental gender, education, perceived risk and trust as relevant variables. The regression model proved to be statistically significant, $\chi^2(6, n=1111) = 115.25, p \leq 0.001$, explaining between 10% (Cox and Snell R -squared) and 14% (Nagelkerke R -squared) of the variance in the willingness to have children vaccinated. As shown in Table 3, all the variables in the model were significant predictors.

Based on regression analysis and after controlling for all other variables in the model, parents who trusted health authorities and healthcare professionals were one and a half times ($OR=1.5$) more likely to be willing to have their children vaccinated than those who reported a low level of trust.

In addition, parents who perceived COVID-19 as a high risk were nearly one and a half ($OR=1.37$) times more likely to be willing to have their children vaccinated. Moreover, there was a significant reduction of 48% ($1-0.52 = 0.48$) in the likelihood of unwillingness to vaccination among fathers compared to

mothers. There was also a marginally significant reduction of 40% ($1 - 0.60 = 0.40$) in the likelihood of unwillingness to vaccination among parents with a

primary- or secondary- school education compared to high-educated parents.

Table 3. Binary logistic regression analysis for variables predicting parental willingness to have their children get COVID-19 vaccines

	<i>B</i>	<i>SE B</i>	<i>df</i>	<i>OR</i>	95% CI	
					Lower Bound	Upper Bound
Predictors of Willingness to Vaccine						
Mother	-0.650***	0.182	1	0.522	0.365	0.746
Trust	0.389***	0.058	1	1.476	1.317	1.653
Perceived risk	0.318***	0.062	1	1.375	1.218	1.552
Parent education						
Primary/secondary school			3			
Diploma (1)	-0.257	0.227	1	0.774	0.496	1.207
Bachelor's degree (2)	-0.176	0.189	1	0.839	0.579	1.214
Higher education (3)	-0.511*	0.257	1	0.600	0.362	0.993

Unwilling to vaccine coded as 0 and willing to vaccine coded as 1.

* $p \leq 0.05$. ** $p \leq 0.01$. *** $p \leq 0.001$.

Discussion

This study examined the role of demographic variables, trust in health authorities and healthcare professionals and parental perceived risk in explaining parents' willingness to have their children inoculated with a COVID-19 vaccine. The results indicated that trust, parental perceived risk and parental gender and educational level were significant predictors of parents' willingness using a representative sample of parents residing in Jordan.

referring to the Department of Statistics (2019), the demographic characteristics of the study sample including age and marital status match the study's population and the increased unemployment rates and reduction in income are parallel with reports by UNDP (2020) rapid assessment during 2020. In addition, the proportional cluster protocol used in this study enhanced the representation of parents of all regions in Jordan.

Six months following the COVID-19 pandemic declaration and after three months of complete lockdown, we found that only a quarter of those parents sampled were willing to have their children inoculated with the new COVID-19 vaccine, which is consistent with previously findings in other countries (Daly & Robinson, 2020; Lin et al., 2020). Other studies

conducted during 2020 indicated a slightly higher percentage of vaccine acceptance than the current findings, such as 28.4% and 37.4% which were reported by Sallam et al. (2021) and El- Elimat et al. (2021), respectively. However, these findings reflect the acceptance of COVID-19 vaccine inoculation for adults, not for children. When looking at the high percentage of the children vaccinated with routine vaccines in Jordan which was 86% by 2018 (Department of Statistics, 2019), it suggests that the novelty of both the infection of COVID-19 during the breakout phase and the subsequent lockdown measures influenced parental perception regarding vaccination. This speculation could be further supported by evidence obtained by a cross-section study (Al-Qerem et al., 2022) conducted one year after the current study, in which a slight elevation of parental acceptance (30.2%) of COVID-19 vaccine for their children was evidenced. Notably, our findings further suggest that parental willingness to have children vaccinated is dictated primarily by trust in health authorities and healthcare professionals.

The parents reported a moderate level of trust in health authorities and healthcare professionals. It was difficult to compare the current result with other recent evidences pertaining to parental trust due to

methodological issues, as variations in measurement scales and study populations. However, Al-Qerem et al. (2022) in their cross-sectional study among parents in Jordan found that 49%-61% of parents “do not intend” or “are not sure” about having their children vaccinated against COVID infection due to lack of trust in government and pharmaceutical companies. In the current study, when parents were asked whether they trusted health authorities’ statements regarding COVID-19, only a quarter of them agreed. El-Elimat et al. (2021) reported a higher trust, in which 45.4% of people surveyed in Jordan trusted healthcare providers as a source of information about COVID-19, noting that El-Elimat et al. had a general-public sample and the current study had only parents. Parents tend to be more cautious when it comes to their children’s affairs. It may be that some were confused owing to the overwhelming amounts of scientific information being disseminated regarding the infection, coupled with the serious economic and psychological fallout caused by the lockdown. It is also possible that official information about COVID-19 vaccination was unclear, especially regarding new methods of developing vaccines and the ingredients comprising them. It is natural that parents would have concerns about the risks that vaccines pose to their children’s health (Robinson et al., 2021). Previous findings indicated that effective communication on the part of healthcare providers can reduce fears regarding COVID-19 vaccination (Braun & O’Leary, 2020).

Another significant predictor of parental willingness to have children vaccinated against COVID-19 is the perceived risk of corona-virus infection, which is consistent with recent evidence obtained from parents in Jordan (Al-Qerem et al., 2022) and internationally (Du et al., 2021). Several studies have shown that the higher the perceived risk, the greater the likelihood to adopt preventive measures (Ibuka et al., 2010; van der Weerd et al., 2011; Yildirim et al., 2021). In our sample, aggregate parental perceived risk for COVID-19 was found to be moderate. This may be due to the mild symptoms in the great majority of children or to the fact that many were asymptomatic or to the mild lockdown measures in force at the time of data collection. In the current study, mothers reported higher levels of perceived risk than fathers, which is consistent with earlier studies (Dryhurst et al., 2020; Yildirim & Guler, 2020).

It is also the case that parents’ willingness to have their children vaccinated depends on the parent’s sex, a finding supported by earlier findings (Killgore et al., 2021). A general-public survey across a number of Arab countries including Jordan indicated that male respondents accepted COVID-19 vaccination more than females (Sallam et al., 2021). In the current study, mothers reported higher levels of perceived risk than fathers, albeit the latter were more willing to have their children vaccinated. It may be that mothers perceive COVID-19 as posing a great risk for their children’s health, yet, at the same time, they may be more concerned than fathers about the efficacy and side effects of the various vaccines, as revealed in the literature (Robinson et al., 2021). For children, the primary care giver is almost always the mother and this is especially the case during bouts of illness. The upheaval created by the COVID-19 pandemic, along with conflicting reports about the nature of the disease and the properties of the vaccine, may have increased unwillingness on the part of mothers to have their children vaccinated. Surprisingly, well-educated parents in our sample proved less willing to have their children vaccinated, which is in line with findings reported by Temsah et al. (2021) and at the same time conflicts with findings reported by Killgore et al. (2021). It may be that these parents were privy to very large amounts of information about the COVID-19 vaccines, some of which were contradictory. This left them bewildered and at the same time skeptical about all the competing facts and claims. Nevertheless, these inconsistent results unfold the role of education with regard to parental willing to have their children vaccinated.

In line with existing evidence, our findings suggest that parental willingness to have their children vaccinated against COVID-19 is generally dictated by non-medical factors, including demographics and sociological factors such as trust (Bunch, 2021; Chou & Budenz, 2020; Ruiz & Bell, 2021). The major factor appears to be trust, thus highlighting the importance of socio-political variables in planning vaccination campaigns directed at children. The study findings further suggest that establishing trust in health authorities and healthcare professionals is key to convincing parents to cooperate. To this end, nurses who represent the majority of healthcare professionals need to provide parents with clear, consistent and reliable information regarding the effectiveness and benefits of

COVID-19 vaccines, as well as the status of the pandemic within the country. A recent report (Abu Farha et al., 2021) indicated that around a half of the surveyed people did not receive adequate information about the benefits of COVID-19 vaccines and more than a half of people obtained information about COVID-19 from healthcare providers, which is a considerable proportion of population that nurses can be actively involved with to establish trust for positive changes toward health-promotion measures against the spread of corona-virus infection. Information could be made available to parents during routine visits to clinics and can also be posted on websites and social media. Moreover, the information disseminated among specific groups should vary in sophistication according to the educational level of the parents, in particular the mothers. Furthermore, as children infected with the corona virus may develop mild symptoms or even be asymptomatic, yet infecting others who may subsequently experience a severe bout of the disease, parents need to be informed about the benefits of COVID-19 vaccines, not only for their children, but also for the wider community. At the same time, we continue to learn more about corona-virus variants, most critically about their transmissibility and severity and the factors that can alter their epidemiological effects on children. Thus, parents need to know that variations in coronaviruses can increase the risk posed to their children's health.

Strengths and Limitations

Our findings highlight factors that inform parental willingness in this regard; they can also be used to promote and reinforce adherence to vaccination protocols, which are essential to protecting children and the wider community. It is also important to acknowledge that the data used in this study, obtained using an online survey, enabled us to access a large proportion of the population and collect a large sample size in a timely manner. Online surveys were found to be valid and reliable (Bartneck et al., 2015). Despite the mentioned strengths, the foremost limitation is that sampling was limited to parents with Facebook accounts, who were selected to participate in the survey, which may induce self-selection bias. The current study was exclusively based on self-report measures and correlations in nature. Also, mothers comprise a large percentage of the study sample, which was also reported

in previous studies pertaining to children's health (Ali & Alma'aytah, 2022; Al-Qerem et al., 2022). This can be explained by the nature of mothers, as they are more concerned and in charge of children's health. However, this limitation is overcome by the large sample size in this study. Further studies are needed to confirm the current findings.

Implications for Nursing

COVID-19 symptoms in children are less severe than in adults (Bhopal et al., 2020), but different virus variants may pose a risk to children in the future. Thus, preventive measures, including vaccination, are the first line of defense for both children and adults. In Jordan, vaccination against COVID-19 is available for both groups. However, hesitancy/unwillingness on the part of parents to have their children vaccinated is prevalent. To address this problem, policy makers and nurses need to implement measures aimed at fostering trust among parents in health authorities' measures, in particular vaccination, to combat the pandemic. For this reason, health authorities ought to communicate clear, accurate and reliable information regarding the risks posed by COVID-19 and the benefits of vaccinating children. In this way, the spread of the infection may be controlled. Nurses can play a pivotal role in promoting COVID-19 vaccination for children by providing updated and transparent information about the possible risks of COVID-19 infection among children and the vaccine's benefits for both children and communities.

Conclusion

The study shows that only around 25% of Jordanian parents were willing to have their children vaccinated against COVID-19. Parental willingness to have their children vaccinated against COVID-19 varies with their education level, gender, trust in health authorities and level of perceived risk. Health-care providers need to provide parents with updated and transparent information about the possible risks of COVID-19 infection among children and the vaccine's benefits for both children and communities.

Acknowledgements

The author would like to thank all parents who participated in this study. Without them, the study could not have come to a successful conclusion. Also, acknowledgement goes to the Faculty of Graduate

Studies at Jordan University of Science and Technology.

The protocol for the research project has been approved by the IRBs in Jordan at Jordan University of Science and Technology (ref/44/134/2020).

REFERENCES

- Abu Farha, R.K., Alzoubi, K. H., Khabour, O. F., & Alfaqih, M. A. (2021). Exploring perception and hesitancy toward COVID-19 vaccine: A study from Jordan. *Human Vaccines & Immunotherapeutics*, 17 (8), 2415-2420. <https://doi.org/10.1080/21645515.2021.1888633>
- Aldakhil, H., Albedah, N., Alturaiki, N., Alajlan, R., & Abusalih, H. (2021). Vaccine hesitancy towards childhood immunizations as a predictor of mothers' intention to have their children vaccinated against COVID-19 in Saudi Arabia. *Journal of Infection and Public Health*, 14 (10), 1497-1504. <https://doi.org/10.1016/j.jiph.2021.08.028>
- Ali, R. A., & Alma'aytah, M. M. (2022). Correlates of parental knowledge about smartphone exposure among young children. *Pediatrics International*, 64 (1). <https://doi.org/10.1111/ped.15246>
- Al-Qerem, W., Al Bawab, A.Q., Hammad, A., Jaber, T., Khdaif, S.I., Kalloush, H., Ling, J., & Mosleh, R. (2022). Parents' attitudes, knowledge and practice towards having their children vaccinated against COVID-19: A cross-sectional study. *Human Vaccines & Immunotherapeutics*, 18 (5). <https://doi.org/10.1080/21645515.2022.2044257>
- Bartneck, C., Duenser, A., Moltchanova, E., & Zawieska, K. (2015). Comparing the similarity of responses received from studies in Amazon's Mechanical Turk to studies conducted online and with direct recruitment. *PLoS One*, 10 (4), e0121595.
- Bhopal, S., Bagaria, J., & Bhopal, R. (2020). Children's mortality from COVID-19 compared with all-deaths and other relevant causes of death: Epidemiological information for decision-making by parents, teachers, clinicians and policy makers. *Public Health*, 185, 19-20. <https://doi.org/10.1016/j.puhe.2020.05.047>
- Braun, C., & O'Leary, S.T. (2020). Recent advances in addressing vaccine hesitancy. *Curr. Opin. Pediatr.*, 32 (4), 601-609. <https://doi.org/10.1097/MOP.0000000000000929>
- Funding or Sources of Financial Support**
- This research was funded by Jordan University of Science and Technology.
- Conflict of Interest**
- No conflict of interest has to be declared by the author.
- Bunch, L. (2021). *A tale of two crises: Addressing Covid-19 vaccine hesitancy as promoting racial justice*. Paper presented at the Hec Forum.
- CheckMarket. (2020). Sample-size calculator. <https://www.checkmarket.com/sample-size-calculator/>
- Chou, W.S., & Budenz, A. (2020). Considering emotion in COVID-19 vaccine communication: Addressing vaccine hesitancy and fostering vaccine confidence. *Health Commun.*, 35 (14), 1718-1722. <https://doi.org/10.1080/10410236.2020.1838096>
- Cori, L., Bianchi, F., Cadum, E., & Anthonj, C. (2020). Risk perception and COVID-19. *Int. J. Environ. Res. Public Health*, 17 (9). <https://doi.org/10.3390/ijerph17093114>
- Daly, M., & Robinson, E. (2020). Willingness to vaccinate against COVID-19 in the US: Longitudinal evidence from a nationally representative sample of adults from April-October 2020. *medRxiv*. <https://doi.org/10.1101/2020.11.27.20239970>
- Department of Statistics. (2017). *Household expenditures & income survey 2017*. https://www.dos.gov.jo/dos_home_a/main/linked-html/household/2017/G3/Table4G3_King.pdf
- Department of Statistics. (2019). *Population-and family-health survey in Jordan (2017-2018)*. https://www.dos.gov.jo/dos_home_a/main/linked-html/DHS2017.pdf
- Department of Statistics. (2020). *Jordan statistical yearbook. 2020*. https://dosweb.dos.gov.jo/databank/yearbook/YearBook_2020.pdf
- Dong, Y., Mo, X., Hu, Y., Qi, X., Jiang, F., Jiang, Z., & Tong, S. (2020). Epidemiological characteristics of 2143 pediatric patients with 2019 corona-virus disease in China. *Pediatrics*, 145 (6), e20200702.
- Dryhurst, S., Schneider, C. R., Kerr, J., Freeman, A. L., Recchia, G., van Der Bles, A. M., Spiegelhalter, D., & van Der Linden, S. (2020). Risk perceptions of COVID-19 around the world. *Journal of Risk Research*, 23 (7-8), 994-1006. [https://doi.org/10.1080/21645515.2022.2044257](https://doi.org/10.1080/10.1080/21645515.2022.2044257)

- [13669877.2020.1758193](https://doi.org/10.3389/FMED.2021.741298/BIBTEX).
- Du, M., Tao, L., & Liu, J. (2021). The association between risk perception and COVID-19 vaccine hesitancy for children among reproductive women in China: An online survey. *Frontiers in Medicine*, 8, 1494. <https://doi.org/10.3389/FMED.2021.741298/BIBTEX>
- Dube, E., Ward, J.K., Verger, P., & MacDonald, N.E. (2021). Vaccine hesitancy, acceptance and anti-vaccination: Trends and future prospects for public health. *Annu. Rev. Public Health*, 42, 175-191. <https://doi.org/10.1146/annurev-publhealth-090419-102240>
- Edwards, K.M., Hackell, J.M., Committee on Infectious Diseases, T. C. O. P., & Ambulatory, M. (2016). Countering vaccine hesitancy. *Pediatrics*, 138 (3). <https://doi.org/10.1542/peds.2016-2146>
- El-Elimat, T., Abu-AlSamen, M.M., Almomani, B.A., Al-Sawalha, N.A., & Alali, F.Q. (2021). Acceptance and attitudes toward COVID-19 vaccines: A cross-sectional study from Jordan. *PLoS One*, 16 (4): e0250555. <https://doi.org/10.1371/journal.pone.0250555>
- Hoang, A., Chorath, K., Moreira, A., Evans, M., Burmeister-Morton, F., Burmeister, F., Naqvi, R., Petershack, M., & Moreira, A. (2020). COVID-19 in 7780 pediatric patients: A systematic review. *EClinicalMedicine*, 24, 100433. <https://doi.org/10.1016/j.eclinm.2020.100433>
- Ibuka, Y., Chapman, G. B., Meyers, L.A., Li, M., & Galvani, A.P. (2010). The dynamics of risk perceptions and precautionary behavior in response to 2009 (H1N1) pandemic influenza. *BMC Infect. Dis.*, 10, 296. <https://doi.org/10.1186/1471-2334-10-296>
- Killgore, W.D.S., Cloonan, S.A., Taylor, E.C., & Dailey, N.S. (2021). The COVID-19 vaccine is here: Now who is willing to get it? *Vaccines (Basel)*, 9 (4). <https://doi.org/10.3390/vaccines9040339>
- Kim, E.Y., Liao, Q., Yu, E.S., Kim, J.H., Yoon, S.W., Lam, W.W., & Fielding, R. (2016). Middle East respiratory syndrome in South Korea during 2015: Risk-related perceptions and quarantine attitudes. *Am. J. Infect. Control*, 44 (11), 1414-1416. <https://doi.org/10.1016/j.ajic.2016.03.014>
- Lee, S.Y., Yang, H.J., Kim, G., Cheong, H.K., & Choi, B.Y. (2016). Preventive behaviors by the level of perceived infection sensitivity during the Korea outbreak of Middle East respiratory syndrome in 2015. *Epidemiol. Health*, 38, e2016051. <https://doi.org/10.4178/epih.e2016051>
- Leung, G.M., Ho, L.M., Chan, S.K., Ho, S.Y., Bacon-Shone, J., Choy, R.Y., Hedley, A.J., Lam, T.H., & Fielding, R. (2005). Longitudinal assessment of community psychobehavioral responses during and after the 2003 outbreak of severe acute respiratory syndrome in Hong Kong. *Clin. Infect. Dis.*, 40 (12), 1713-1720. <https://doi.org/10.1086/429923>
- Liao, Q., Cowling, B., Lam, W.T., Ng, M.W., & Fielding, R. (2010). Situational awareness and health protective responses to pandemic influenza A (H1N1) in Hong Kong: A cross-sectional study. *PLoS One*, 5 (10), e13350. <https://doi.org/10.1371/journal.pone.0013350>
- Lin, C., Tu, P., & Beitsch, L.M. (2020). Confidence and receptivity for COVID-19 vaccines: A rapid systematic review. *Vaccines (Basel)*, 9 (1). <https://doi.org/10.3390/vaccines9010016>
- Lu, X., Zhang, L., Du, H., Zhang, J., Li, Y.Y., Qu, J., Zhang, W., Wang, Y., Bao, S., Li, Y., & Wu, C. (2020). SARS-CoV-2 infection in children. *N. Engl. J. Med.*, 382 (17), 1663-1665. <https://doi.org/10.1056/NEJMc2005073>
- Our World in Data. (2021). *Jordan: Corona-virus pandemic country profile*. <https://ourworldindata.org/coronavirus/country/jordan>
- Patrick, S. W., Henkhaus, L. E., Zickafoose, J. S., Lovell, K., Halvorson, A., Loch, S., Letterie, M., & Davis, M. M. (2020). Well-being of parents and children during the COVID-19 pandemic: A national survey. *Pediatrics*, 146 (4). <https://doi.org/10.1542/peds.2020-016824>
- Poynton, T. A., DeFouw, E. R., & Morizio, L. J. (2019). A systematic review of online response rates in four counseling journals. *Journal of Counseling & Development*, 97 (1), 33-42. <https://onlinelibrary.wiley.com/doi/abs/10.1002/jcad.12233>
- Robinson, E., Jones, A., Lesser, I., & Daly, M. (2021). International estimates of intended uptake and refusal of COVID-19 vaccines: A rapid systematic review and meta-analysis of large nationally representative samples. *Vaccine*, 39 (15), 2024-2034. <https://doi.org/10.1016/j.vaccine.2021.02.005>
- Ruiz, J. B., & Bell, R.A. (2021). Predictors of intention to vaccinate against COVID-19: Results of a nationwide survey. *Vaccines*, 39 (7), 1080-1086. <https://doi.org/10.1016/j.vaccine.2021.01.010>
- Sallam, M., Dababseh, D., Eid, H., Al-Mahzoum, K., Al-Haidar, A., Taim, D., Yaseen, A., Ababneh, N.A., Bakri, F.G., & Mahafzah, A. (2021). High rates of

- COVID-19 vaccine hesitancy and its association with conspiracy beliefs: A study in Jordan and Kuwait among other Arab countries. *Vaccines*, 9 (1), 42. <https://doi.org/10.3390/vaccines9010042>
- Skjefte, M., Ngirbabul, M., Akeju, O., Escudero, D., Hernandez-Diaz, S., Wyszynski, D.F., & Wu, J.W. (2021). COVID-19 vaccine acceptance among pregnant women and mothers of young children: Results of a survey in 16 countries. *European Journal of Epidemiology*, 36 (2), 197-211. <https://doi.org/10.1007/s10654-021-00728-6>
- Su, L., Ma, X., Yu, H., Zhang, Z., Bian, P., Han, Y., Sun, J., Liu, Y., Yang, C., Geng, J., Zhang, Z., & Gai, Z. (2020). The different clinical characteristics of coronavirus disease cases between children and their families in China: The character of children with COVID-19. *Emerg. Microbes Infect.*, 9 (1), 707-713. <https://doi.org/10.1080/22221751.2020.1744483>
- Temsah, M. H., Alhuzaimi, A. N., Aljamaan, F., Bahkali, F., Al-Eyadhy, A., Alrabiaah, A., Alhaboob, A., Bashiri, F.A., Alshaer, A., Temsah, O., Bassrawi, R., Alshahrani, F., Chaiah, Y., Alaraj, A., Assiri, R.A., Jamal, A., Batais, M. A., Saddik, B., Halwani, R., & Alhasan, K. (2021). Parental attitudes and hesitancy about COVID-19 versus routine childhood vaccinations: A national survey. *Frontiers in Public Health*, 1513. <https://doi.org/10.3389/FPUBH.2021.752323/BIBTEX>
- The Earth Institute of Columbia University. (2012). *Background document for the national poverty-reduction strategy*. The Hashemite Kingdom of Jordan: Ministry of Planning. [https://www.mop.gov.jo/ebv4.0/root_storage/en/eb_list_page/jordan_nrps_background_paper-feb21-2012_\(2\).pdf](https://www.mop.gov.jo/ebv4.0/root_storage/en/eb_list_page/jordan_nrps_background_paper-feb21-2012_(2).pdf)
- UNDP. (2020). *Covid-19 impact on households in Jordan: A Rapid Assessment*. <https://www.reliefweb.int/sites/reliefweb.int/files/resources/77030.pdf>
- van der Weerd, W., Timmermans, D.R., Beaujean, D.J., Oudhoff, J., & van Steenbergen, J.E. (2011). Monitoring the level of government trust, risk perception and intention of the general public to adopt protective measures during the influenza A (H1N1) pandemic in the Netherlands. *BMC Public Health*, 11, 575. <https://doi.org/10.1186/1471-2458-11-575>
- WHO. (2021). *Corona-virus disease (COVID-19) pandemic*. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- WHO. (2022). *Annexes to the recommendations for use of the Pfizer–BioNTech vaccine BNT162b2 against COVID-19*. <https://www.who.int/publications/i/item/who-2019-ncov-vaccines-sage-recommendation-bnt162b2-grade-etr-annexes>
- Xu, Y., Li, X., Zhu, B., Liang, H., Fang, C., Gong, Y., Guo, Q., Sun, X., Zhao, D., Shen, J., Zhang, H., & Gong, S. (2020). Characteristics of pediatric SARS-CoV-2 infection and potential evidence for persistent fecal viral shedding. *Nat. Med.*, 26 (4), 502-505. <https://doi.org/10.1038/s41591-020-0817-4>
- Yan, Z., Yang, M., & Lai, C.L. (2021). COVID-19 vaccinations: A comprehensive review of their safety and efficacy in special populations. *Vaccines*, 9 (10), 1097. <https://doi.org/10.3390/vaccines9101097>
- Yildirim, M., & Guler, A. (2020). Factor analysis of the COVID-19 perceived risk scale: A preliminary study. *Death Stud.*, 1-8. <https://doi.org/10.1080/07481187.2020.1784311>
- Yildirim, M., Gecer, E., & Akgul, O. (2021). The impacts of vulnerability, perceived risk and fear on preventive behaviours against COVID-19. *Psychol. Health Med.*, 26 (1), 35-43. <https://doi.org/10.1080/13548506.2020.1776891>