

Attitudes of Parents Toward Routine Children Vaccination During the COVID-19 Pandemic

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(Ann Coll Med Mosul 2023; 45 (2):209-217).

Received: 14th Augu. 2023; Accepted: 30th Augu. 2023.

ABSTRACT

Objective: To understand the impact of a novel COVID-19 pandemic on parents' general attitudes about children's vaccines.

Materials and Methods: 625 parents of children under the age of six who visited the four primary healthcare centers between December 1, 2022, and March 30, 2023, participated in the study. A total of 17 questions were asked about children's vaccination state and sociodemographic characteristics of participants and their children, Additional research on attitudes and conduct around routine childhood vaccinations during the COVID-19 pandemic.

Results: 25.44% (n = 159) of the participants had children with delayed vaccination. Reasons for delaying vaccinations during the pandemic were discovered including 88.68% (n = 141) reasons related to COVID-19, where the participants stated 68.55 (n=109) "fear of COVID-19 infection," 12.25% (n = 20) "one or more of the family member was infected by COVID-19 this lead to the entire family is in quarantine," and 7.55% (n = 12) "curfew or transportation issues." the most influencing variables for vaccination when parents visit a healthcare center were "children's routine vaccinations are essential and must be given. Further, they have been informed that the required precautions are being taken, and they are aware of how the COVID-19 infection is spread.."

Conclusion: Parents should be told by healthcare workers that vaccination is essential and must be given on schedule at all times during a pandemic with continuous appointments for vaccination procedures during a pandemic.

Keywords: Attitude , Children , COVID-19 , Pandemic , Vaccination .

مواقف الآباء تجاه التطعيم الروتيني للأطفال أثناء جائحة COVID-19

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الخلاصة

الهدف : فهم تأثير جائحة COVID-19 الجديد على المواقف العامة للآباء حول لقاحات الأطفال.
المواد والطرق : شارك في الدراسة 625 من أولياء أمور الأطفال دون سن السادسة الذين زاروا مراكز الرعاية الصحية الأولية الأربعة في الفترة ما بين 1 ديسمبر 2022 و 30 مارس 2023. تم طرح ما مجموعه 17 سؤالاً حول حالة تطعيم الأطفال والخصائص الاجتماعية والديموغرافية للمشاركين وأطفالهم ، وبحوث إضافية حول المواقف والسلوك حول التطعيمات الروتينية للأطفال أثناء جائحة COVID-19.

النتائج : 25.44% (العدد = 159) من المشاركين لديهم أطفال يعانون من تأخر في التطعيم. تم اكتشاف أسباب تأخير التطعيمات أثناء الجائحة بما في ذلك 88.68% (العدد = 141) أسباب تتعلق بـ COVID-19 ، حيث ذكر المشاركون 68.55 (العدد = 109) "الخوف من الإصابة بـ COVID-19، 12.25% (العدد = 20) "أصيب فرد أو أكثر من أفراد الأسرة بفيروس COVID-19 ، مما أدى إلى وضع العائلة بأكملها في الحجر الصحي" ، و 7.55% (العدد = 12) "مشكلات حظر التجول أو النقل". كانت المتغيرات الأكثر تأثيراً في التطعيم عند زيارة الوالدين لمركز الرعاية الصحية هي "التطعيمات الروتينية للأطفال ضرورية ويجب إعطاؤها. علاوة على ذلك ، تم إبلاغهم بأنه يتم اتخاذ الاحتياطات اللازمة ، وهم على دراية بكيفية انتشار عدوى COVID-19 .."

الخلاصة: يجب إخبار الوالدين من قبل العاملين في مجال الرعاية الصحية أن التطعيم ضروري ويجب إعطاؤه في الموعد المحدد في جميع الأوقات أثناء الجائحة و استمرارية المواعيد لإجراءات التطعيم أثناء الجائحة.

الكلمات المفتاحية: موقف ، أطفال ، كوفيد-19 ، جائحة ، تطعيم .

INTRODUCTION

Coronavirus disease (COVID-19), brought on by the coronavirus-2 causes severe acute respiratory illness quickly spreading worldwide. Over 67 million confirmed cases and more than 6 million recorded fatalities have been reported, according to the World Health Organization (as of January 31, 2023) ¹. Governments have adopted several measures to combat the pandemic, such as quarantine, flexible working hours, school closures, and the prohibition of meetings and social activities ^{2,3}. In addition to these preventive steps, on March 17, 2020, the Iraqi government imposed a lockdown through the committee, announcing entire lockdown measures until April 21, 2020. These included shutting down all public and commercial organizations, limiting transportation, and restricting travel between cities ^{4,5}.

The COVID-19 pandemic afflicted the world, resulting in limitations on global trade and challenging medical travel. Vaccination services were a different, less often mentioned factor ^{6,7}.

In Iraq, routine children's vaccinations are given at no cost to children and are delivered by appointment. The current study goals are to evaluate the COVID-19 pandemic's effects on routine vaccination of children under the age of six and to identify the variables influencing vaccination in Mosul, Iraq, during the pandemic.

METHODS

Study Design

This study was conducted in Mosul, Iraq, between December 1, 2022, and March 30, 2023, as a cross-sectional study using a questionnaire among parents of children under the age of six years.

Participants and Sample Size

The study was to be done with parents whose children were under the age of six years during the COVID-19 pandemic lockdown in 2020, and who had visited the selected primary healthcare centers. The parents were chosen at random, and face-to-face interviews were conducted with the 625 participants who met the criteria and agreed to participate in the study (an acceptable margin of error of 5% with a 95% confidence interval was obtained using the Epi-Info program with a minimum sample size of 263 participants).

Inclusion Criteria

Parents of children under the age of 6 during the lockdown COVID-19 pandemic in 2020.

Exclusion Criteria

- 1.Children without documentation of vaccination.
- 2.Family with more than one child who deserves vaccination during the lockdown period.

Data Collection

A questionnaire was used to gather information about children and parents' socioeconomic background (Table 1), the vaccination status of their children, and reasons for routine delays. It was conducted face-to-face by researchers. The study was limited to those who completed the questionnaire in its entirety.

In Iraq, vaccines are provided freely at the primary healthcare centers (PHCC). Vaccinations are frequently administered to children under the age of six. The selection of the PHCC was done using a multi-stage simple random sampling strategy, which included four PHCC (Al-Quds and Al-Jazaer) in the Left Primary Health Care Sector, and (Al-Tibalriadi and Al-Qarbi) in the Right Primary Health Care Sector.

According to the study, some parents delayed their children's vaccines, while others followed the recommended vaccine schedule. Parents who vaccinated their children after the scheduled appointment were classified as those who delayed vaccines, while families who vaccinated their children at the appropriate age of the vaccine schedule were considered to have no delayed vaccines.

Pilot Study

A pilot study's purpose was to validate and test the tool's reliability. It was carried out by 39 participants to ensure that the questionnaire was clear and consistent. Participants were directed to complete the questionnaire, record how long it took them to complete it, and then score the clarity of their responses using five Likert scales: 1 (very not clear), 2 (not clear), 3 (neither clear nor not clear), 4 (clear), and 5 (very clear). Following the evaluation, at a 95% confidence level and 0.17 standard deviation, the questions obtained an average clarity score of 4.75 ($\pm 1.17\%$ margin of error). The questionnaire took an average of 6 (± 2) minutes to complete.

Finally, the questionnaire was modified to fit the purpose of our study and was reviewed by specialized physicians who were not included in the final analysis.

Administrative Agreement and Ethics Approval:

The research proposal and access to research data were approved scientifically and ethically by the scientific committee in the family and community medicine department and the high education committee of the College of Medicine, University of Mosul. In addition to institutional review board approval of the study protocol was obtained by the Nineveh Health Directorate. Every participant who took part in this study provided written informed consent. There was no additional cost or harm imposed on participants, and no personal data such as personal names were recorded to safeguard privacy.

Statistical Analysis

The Statistical Package for Social Sciences version 28.0 software SPSS (IBM Corp.; Armonk, NY, USA) was used for all statistical analyses in the study. The *P* value < .05 was accepted as statistically significant for all analyses. The Chi-square test was used to measure associations between the variables. Binary logistic regression was conducted using variables with a 95% Confidence Interval (CI) to examine the impact of various factors on the variable "delayed vaccination," and odds ratio (OR) values were provided in the regression table.

Binary logistics regression model analysis was used for predicting the association between vaccination status and socio-demographic characteristics, and adjusted odds ratios were used.

RESULTS

In the current study, the 625 participants (all of them were mothers) with four hundred and sixty-six children were immunized with all vaccinations without delay, but one hundred and fifty-nine children had one vaccine or more than one delayed dose and were considered to have had delayed vaccination. Figure 1 shows the frequencies and percentages of vaccination states for children.

Independent Factors:

In this study, the sociodemographic data for children, mothers, and family types with income are shown in Table 1. The number of male and female children was nearly equal, the most frequent child age was between 2 and less than 4

months equal to 145 (23.2%), and the child order was mainly second 209 (33.4%). The mothers participated in the study with an average age was 27.2 ± 5.32 years (min-max = 18-39). The main educational level for the mothers was secondary 267 (42.7%), and the majority of families with income (400.000-<1000.000) Iraqi Dinars was 351 (56.2%), and the family types were mainly extended 400 (64%). The presence of both mother and father was 615 (98.4%).

Factors Associated with Delaying:

The factors associated with delayed vaccination with a very highly significant *P* value (<0.001) for child age, child order, mother's educational level, and family income as shown in Table 2.

In the multivariate analysis, the child aged ≥ 9 months or the child ordered third or more or lower the mother's educational level or increased family income were discovered to be independently related to delayed vaccinations, the results are shown in Table 3.

The other results for the gender of the child, age of the mother, father and mother's presence, and family type have no significant association with vaccination delay.

As the Omnibus test of the model coefficient was highly significant, the model generated demonstrated significant goodness of fit (*P* value < 0.001, degree of freedom = 8), indicating that the model was worthwhile. Also, Hosmer and Lemeshow's test, which is the most reliable test of goodness of fit, supported the goodness of fit of the model (*P* value = 0.52, degree of freedom = 8)^{8,9}. The Cox and Snell R Square test result was 0.14, and the Nagelkerke R Square test result was 0.213, indicating that the set of variables put into the model explained between 14% and 21% of the variability.

Reported Reasons for Vaccination Delay:

When the participants were asked about the reasons for delaying the vaccination of their children during the pandemic lockdown, 68.55% (n = 109) said that "fear of getting COVID-19 infection" is the main cause for delayed vaccination for their children, 12.58% (n = 20) said "As a result of someone in our family contracted COVID-19, the vaccine has been delayed until the isolation period is over," 7.55% (n = 12) said for both "curfew or transportation issues, and the child was sick" as the main causes, 1.88% (n = 3) said that "I have no times," 1.26% (n = 2) said that "the doctor asked them to postponed the child vaccination," and only one participant 0.63% said that "the vaccination is not important for child health and wellness" as shown in table 4.

Reported Reasons for No Vaccination Delay:

Those who visited a healthcare center for vaccination explained that routine children's vaccines are essential and must be administered for a child's good health and wellness, and they were informed that necessary precautions had been taken, in addition to being well informed about ways of getting the COVID-19 infection.

DISCUSSION

The COVID-19 pandemic has serious consequences that go beyond the immediate hazardous health and economic impacts. In this study, routine children's vaccination delay rate was 25.44%. During the pandemic, vaccination rates dropped in Indonesia, Pakistan, Senegal, Vietnam, and many other nations^{3,10}.

Worldwide studies have found a higher rate of delay¹¹⁻¹⁴, these results go on for example research conducted in India on 25,517 children under the age of five indicated that more than half of them experienced delays¹⁵. Hu *et al.* investigated 2,772 children aged 24-35 months in China and discovered that age-appropriate vaccination rates ranged from 25.4% for BCG to 91% for OPV1¹⁶.

According to the questionnaire findings, the most afflicted children were ≥9 months old, this may be attributed to the parents of more elder children taking more information and advice from previous vaccination visits, this result is against other studies¹⁷⁻¹⁹, and according to Ji *et al.* (2022)²⁰, reported that older (15- and 18-month-old) children had suffered a greater reduction in vaccination coverage than younger children. As children get older, there may be more delays in attending routine appointments. This may be due to decreased apparent infectious concerns for older children, especially if they stay at home during the lockdown.

The larger the household size and the greater the number of children in the family, the greater the risk of vaccine delay, which is consistent with prior studies establishing the relationship between higher household size and vaccination delay in children^{21,22}. This might be owing to increasing parental responsibilities, forcing parents to miss vaccinations due to overwhelm. Furthermore, the parents are concerned about other children contracting diseases.

In Iraq, major healthcare services (such as children's healthcare) are provided free of charge to the whole community. All children served by public health centers are eligible for health services (including vaccinations)²³, as a result, there is no fee paid for children's vaccination, which contrasts

with several studies, such as Zuber *et al.* (2001) and Nyandekwe *et al.* (2020)^{24,25} in which the economic gap of parents influences vaccine uptake since impoverished parents may be unable to afford health care costs.

According to the current study, the lower level of the mother's education is one of the important factors for delayed vaccination, and this results in agreement with Sood *et al.*, (2015)²⁶.

According to the current questionnaire, 68.55% of the participants reported that the major reason for postponing vaccination throughout the pandemic was "fear of COVID-19 infection," and that parents were anxious and fearful of their children becoming infected with COVID-19 when they had been vaccinated²⁷. Research in Saudi Arabia discovered that fear of having COVID-19 infection during the pandemic caused a 60.9% delay in routine vaccinations, which confirms the results of this study²⁸.

Under this study, the second reason for delayed vaccination occurred when the child's household was under quarantine. It is recommended that infected individuals with COVID-19 infection and close contact with infected individuals postpone their vaccination appointment date until the completion of their isolation time²⁹.

Because of the pandemic, routine vaccinations were delayed due to access and provider issues.^{3,19} A 48-person survey from 18 nations discovered that a lack of access to services was a key factor in dropping vaccination rates²⁷. The findings of our study were consistent with the findings of the previous study, as curfew or transportation issue is one of the important reasons for delayed routine children's vaccination.

Limitations of the Study

While the study's findings are substantial, it is not without limits. The fact that the analysis is based only on data from metropolitan healthcare centers. Furthermore, due to the small number of questions. Furthermore, memory bias (recall bias) may have been introduced in this study, and the results may have been impacted by subjectivity. Nonetheless, our study contributes to a better understanding of the overall picture of vaccination delays during the pandemic. As a result, the data might be utilized to develop methods for improving routine vaccination program coverage during catastrophic events and pandemics.

CONCLUSION

The current study's findings revealed various hurdles to timely vaccination. During the pandemic, most parents expressed "fear of getting COVID-19 infection." Nonetheless, we discovered that parents had their children vaccinated. It was revealed that parents' vaccination decisions were influenced by their awareness of the need for childhood vaccination, and the fact that the vaccination service was performed as usual. Furthermore, being confined due to a family member being sick with coronavirus and curfew or transportation concerns were crucial factors in postponing the vaccinations during the pandemic. Finally, The findings imply that during a pandemic, maintaining vaccination service schedules, alerting parents by phone, and comforting parents might avert a reduction in vaccination rates.

Author Contributions

OBB established the study inquiries, planned and implemented the study, handled and evaluated the results, aided in writing conclusions, wrote the first draught of the paper, and completed the article. WGA aided in the formulation of the study inquiries, the design of the study, and the results writing, as well as in reading and approval of the article. Both authors participated in the study and authorized the final version.

Declaration of Interests

The authors have no conflicts of interest to disclose.

Funding

The authors declared that this study got no financial assistance.

Acknowledgments

Special thanks to the College of Medicine, University of Mosul, and the Public Health Department, Nineveh Health Directorate for their support in conducting the study.

Highlights

What is currently known about this subject?

- About 2-3 million lives are saved from death each year because of vaccination.
- As a consequence of a drop in vaccination rates, appropriate protection against avoidable illnesses is likely to be impaired.
- A pandemic threatens routine children's vaccination.

What contribution does this study add to this subject?

- During the pandemic, this study looks into parents' attitudes toward routine children's vaccination.
- When families attend a healthcare institution, they are afraid and anxious about the spread of COVID-19.
- Fear of spreading the disease COVID-19 causes a delay in vaccination promptly.

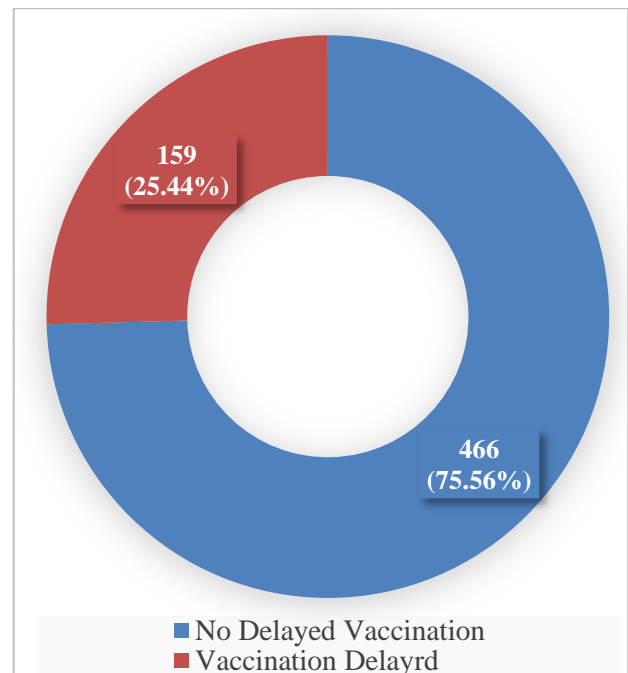


Figure 1: Routine vaccination state for children under 6 years.

Table 1: The sociodemographic data for children, mothers, family type, and family income.

Sociodemographic factor		Frequency	Percent (%)
Child gender	Female	309	49.4%
	male	316	50.6%
Child age	(0-< 2) months		
	(2-< 4) months	85	13.6%
	(4-< 6) months	145	23.2%
	(6-<9) months	135	21.6%
	(9-<12) months	99	15.84%
	(1-<1.5) years	50	8%
	(1.5-<4) years	59	9.44%
	(4-6) years	38	6.08%
Child order	First	191	30.6%
	Second	209	33.4%
	Third	127	20.3%
	Fourth or more	98	15.7%
Mother age	(18-<26) years	263	42.1%
	(26-<33) years	237	37.9%
	(33-40) years	125	20%
Mother educational level	Primary	189	30.2%
	Secondary	267	42.7%
	University or higher	169	27%
Father and mother presence	Father	-	-
	Mother	10	1.6%
	(father and mother)	615	98.4%
Family type	Nuclear	225	36%
	Extended	400	64%
Family income	<400.000 ID		
	(400.000-<1000.000) ID	217	34.72%
	(1000.000-<2000.000) ID	351	56.16%
	(2000.000-<4000.000) ID	41	6.56%
	(≥4000.000) ID	16	2.56%

Table 2: The factors associated with routine children vaccination state.

Factor	Vaccination state (no., %)			Total	P value
	No delayed vaccination	Delayed vaccination			
Child gender	Female	224 (72.5%)	85 (27.5%)	309	0.240
	Male	242 (76.6%)	74 (23.4%)	316	
Child age	0-2 months	58 (68.2%)	27 (31.8%)	85	< 0.001
	2-< 4 months	112 (77.2%)	33 (22.8%)	145	
	4-<6 months	91 (67.4%)	44 (32.6%)	135	
	6-< 9 months	59 (59.6%)	40 (40.4%)	99	
	9-<12 months	44 (88%)	6 (12%)	50	
	1-6 years	102 (91.9%)	9 (8.1%)	111	
	First	153 (80.1%)	38 (19.9%)	191	
	Second	167 (79.9%)	42 (20.1%)	209	
Child order	Third	92 (72.4%)	35 (27.6%)	127	< 0.001
	Fourth or more	54 (55.1%)	44 (44.9%)	98	
Mother age	18-<26 years	206 (78.3%)	57 (21.7%)	263	0.115
	26-<33 years	174 (73.4%)	63 (26.6%)	237	
	33-40 years	86 (68.8%)	39 (31.2%)	125	
	Father and mother presence	-	-	-	
Father and mother presence	Mother	5 (50%)	5 (50%)	10	0.072
	Both	461 (75%)	154 (25%)	615	
	Mother educational level	121 (64%)	68 (36%)	189	
Mother educational level	Secondary	203 (76%)	64 (24%)	266	<0.001
	University	142 (84%)	27 (16%)	169	
	Family income	178 (82%)	39 (18%)	217	
Family income	<400.000 ID	259 (73.8%)	92 (26.2%)	351	< 0.001
	1000.000-<2000.000 ID	27 (52.9%)	24 (47.1%)	51	
	≥2000.000 ID	2 (33.3%)	4 (66.7%)	6	
	Family type	158 (70.2%)	67 (29.8%)	225	
Family type	Extended	308 (77%)	92 (23%)	400	0.062

Table 3: Predictors of vaccination delay in children.

FACTORS	P VALUE	ODDS RATIO	95% CI (LOWER - UPPER)
CHILD AGE	<0.001		
(2-<4) MONTHS VS (0-<2) MONTHS	0.942	1.02	0.49-2.11
(4-<6) MONTHS VS (0-<2) MONTHS	0.79	1.09	0.56-2.14
(6-<9) MONTHS VS (0-<2) MONTHS	0.89	0.95	0.45-1.9
(9-<12) MONTHS VS (0-<2) MONTHS	<0.001	0.11	0.03-0.37
(1-6) YEARS VS (0-2) MONTHS	<0.001	0.12	0.08-0.3
CHILD ORDER	<0.001		
SECOND VS FIRST	0.499	1.21	0.69 – 2.11
THIRD VS FIRST	0.001	2.91	3.48 – 16.59
FOURTH AND MORE VS FIRST	<0.001	7.6	0.1 – 1.46
MOTHER EDUCATIONAL LEVEL	<0.001		
SECONDARY SCHOOL VS PRIMARY SCHOOL	0.002	0.45	0.2 – 0.56
UNIVERSITY OR HIGHER VS PRIMARY SCHOOL	<0.001	0.21	0.12 – 0.39
FAMILY INCOME	<0.001		
(400.000-<1000.000) ID VS <400.000 ID	0.33	1.27	0.79 – 2.05
(1000.000-<2000.000) ID VS <400.000 ID	0.007	3.35	1.39 – 8.06
≥2000.000 ID VS <400.000 ID	0.006	5.79	1.64 – 20.39

Note: (P value < 0.05 means significant difference, P value < 0.01 means highly significant difference and P value < 0.001 means very highly significant difference).

Table 4: Reported reasons for vaccination delay

Reasons for delayed vaccination	Frequency	Percent %
COVID-19-related 141 (88.68%)		
Fear of COVID-19 infection.		
Someone in our family contracted COVID-19, and the entire family was confined.	109	68.55
Curfew or transportation issues.	20	12.58
	12	7.55
Not COVID-19-related 18 (11.32%)		
The child was sick.		
I have no time.	12	7.55%
The doctor asked them to postpone the child's vaccination.	3	1.88%
	2	1.26%
The vaccine is not vital for child health and wellness.	1	0.63%
Total	159	100%

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