

Mothers' Perception Regarding Routine Immunization for Their Children during the COVID-19 Pandemic

Noha Adel Ahmed¹, Hemat Abd El Moneem El Sayied², Fathia Hamdy Ahmed³

1) B.in Nursing Science

2) Professor of Community Health Nursing, Faculty of Nursing, Ain Shams University.

3) Lecturer of Community Health Nursing, Faculty of Nursing, Ain Shams University.

Abstract

Background: Immunization is a global health success story, saving millions of lives every year. **Aim:** This study aims to assess mothers' perception regarding routine immunization for their children during the Covid-19 pandemic. **Design:** A descriptive exploratory research design was used in this study. **Setting:** The study was conducted at four settings of maternal and child health care centers in Obour, Qalioubiya Governorate. **Sampling:** The study included a sample of convenience (380) mothers accompanied with their children under 2 years old. **Tools of Data Collection:** **Tool I:** Structured interview questionnaire divided into five parts: **Part I:** It was concerned with demographic characteristics of the mothers and children. **Part II:** Presented health history of children, health needs and health problems. **Part III:** Displayed mothers' knowledge regarding routine immunization for their children during Covid-19. **Part IV:** Mentioned mothers' reported practices regarding routine immunization for their children. **Part V:** Revealed mothers' perception regarding routine immunization for their children. **Tool II:** It concerned with anthropometric measures for children. **Result:** The current study showed highly statistically significant differences between mothers' total knowledge and their reported practices as well as mothers' perception regarding routine immunization for their children during the Covid-19 pandemic. **Conclusion:** Findings of this study concluded that there was lack of mothers' knowledge toward routine immunization, which in turn affected their practices and their perception regarding routine immunization and MCH policy during the Covid-19 pandemic. As well, there were statistically significant relations in total score of knowledge and mothers' reported practices as well as mothers' perception regarding routine immunization for their children during the Covid-19 pandemic. **Recommendation:** Counseling session should be offered by community health nurses to upgrade parents' knowledge, practices and perception with special emphasis on less educated ones regarding immunization during the Covid-19 pandemic.

Key words: Perception, Routine Immunization, COVID-19, Pandemic.

Introduction

Childhood Immunization programs are an important part of the approach for increasing herd immunity and, as a result, lowering child mortality in countries. Vulnerable children are protected in communities with herd immunity, which is achieved via widespread immunization of the community. This means that the majority of people they come into touch with are immune and hence unable to transfer communicable disease. Furthermore, the timing of childhood immunization is essential since immunizing children too early or too close

together can dramatically reduce the length of protection or conflict with the immune response (Noh *et al.*, 2019).

The global pandemic of coronavirus disease (COVID-19) has disrupted almost every aspect of human effort, forcing countries to implement unprecedented public health measures designed to mitigate the virus's effects, such as complete lockdown (inter and intra), travel bans, quarantine, and social distancing. The COVID-19 pandemic control measures have also limited the operations of the routine immunization system. COVID-19 has an impact on mothers' visits for the expanded

program of immunizations (EPI), as well as on vaccination and vaccine-preventable disease (VPD) tracking indicators, as well as on the notification of increased or decreased morbidity and mortality (*Bello et al., 2021*).

More children in more nations are now protected against more vaccine-preventable diseases than at any other time in history. However, thanks to COVID-19, this great success is now endangered, putting diseases like measles and polio at risk of recurrence. Maintaining immunization programs will prevent future outbreaks because world don't want to replace an outbreak with another one (*WHO, 2022*).

According to a research by the World Health Organization's Global Immunization Division and the Centers for Disease Control and Prevention (CDC), global parental practices and knowledge about immunization programs are poor, and parents have unfavorable perceptions about them during the COVID 19 pandemic. As a result, parental vaccine practices and beliefs play a crucial role in determining a child's immunization status, particularly during COVID 19 quarantine (*Ghareeb & Mohamed, 2021*).

Due to the risk of transmission of SARS-CoV-2 and the stages of the COVID-19 pandemic, many countries have temporarily suspended preventive mass vaccination campaigns against diseases such as cholera, measles, meningitis, polio, tetanus, typhoid, and yellow fever. Measles and polio vaccination campaigns have been particularly hard hit, with measles campaigns suspended in 27 countries and polio campaigns halted in 38 (*Russo & Bozzola, 2021*).

Community health nursing (CHN) as a key component of primary health care (PHC) services play key roles in communicable disease prevention by immunization and health promotion, as well as managing and providing care and follow-up in a variety of settings. These roles are clearly summarized in the various definitions that describe CHN not only in health promotion, such as education, counselling, the provision of support tools, and

community mobilization, but also in management and policy, such as policy development, planning, evaluation, advocacy, and supporting the development and implementation of effective national responses in accordance with national contexts, needs, and priorities (*Abbas et al., 20 21*).

Significance of the study

Immunization refusal is characterized as a delay in accepting or refusing vaccines despite immunization services being available. According to the World Health Organization (WHO), one out of every five children in the world does not receive routine life-saving immunizations, and 1.5 million children die each year from diseases that could have been averted with vaccines. Because childhood immunizations are so important, it is critical that the implementation process against vaccine-preventable diseases be closely monitored. One of the program's challenges is failing to receive the recommended immunizations at the recommended time (*Hussin & Marzo, 2020*).

In Egypt, estimate based on coverage by The Egyptian Ministry of Health and Population (MOHP), reported that the decline is about three percent between 2019 and 2020 for the childhood routine immunizations. Country indicates that underestimation of the numerator might be due to late children immunization between vaccination centers due to the COVID-19 pandemic (*UNICEF & WHO, 2021*).

Childhood vaccination reduces the mortality rate. Of note, during the COVID-19 pandemic some childhood vaccinations were delayed or missed. Specifically, after March 2020 considerably fewer children received the vaccines against diphtheria, pertussis, tetanus, and measles compared to 2019. Several reasons contributed to this decline including the lack of access to health services due to lockdown restrictions, and the shortage of health care staff during the COVID-19 pandemic. As well, there is an increasing concern that the pandemic regulations influenced health care professionals'

communications with parents, hence limiting routine vaccination promotion (*Fakonti et al., 2022*).

Except for the COVID-19 pandemic, parental hesitancy toward childhood vaccination affects childhood vaccination uptake. Mothers' perception toward vaccines may influence decisions to vaccinate their child/children. Mothers' vaccination behavior and experiences may result in childhood vaccination delays or refusal. In addition, negative opinions toward vaccination may enhance the risk of unvaccinated children and increase the likelihood of disease outbreaks. Recently, outbreaks of vaccine-preventable disease were observed due to inadequate vaccination rates; hence it is essential to estimate the parental attitudes toward childhood vaccinations. Mothers seem to have a prime role in childcare (*Bimpong et al., 2021*).

AIM OF THE STUDY

This study aims to assess mothers' perception regarding routine immunization for their children during the COVID-19 pandemic through:

- Assessing mothers' knowledge regarding routine immunization for their children during the COVID-19 pandemic.
- Assessing mothers' practice regarding routine immunization for their children during the Covid-19 pandemic.
- Identifying health needs and problems of children during the Covid-19 pandemic.
- Assessing mothers' perception regarding the protective measures during routine immunization for their children and the MCH policy during the COVID-19 pandemic.

Research questions:

1.What are the health needs and problems of children during Covid-19 pandemic?

2.What are the mothers' knowledge and practices regarding routine immunization for their children during Covid-19 pandemic?

3.What is the mothers' perception of the protective measures while vaccinating their children?

4.What is the mothers' perception of MCH policy during Covid-19 pandemic?

SUBJECTS AND METHODS

I. Technical Design:

This design involved research design, settings, subjects of the study, and tools used in the study.

Research design:

A descriptive exploratory research design was used to conduct this study.

Inclusion criteria:

Mothers accompanied with their children under 2 years old attended to the MCH centers in Obour City.

Setting:

This study was conducted at four settings of maternal and child health care centers in Obour City Qalioubiya Governorate, these were: El-Mostakbal MCH, El-Shabab MCH, the 1st district MCH and El-Tarfihay MCH.

Sampling: The study included a sample of convenience (380) mothers accompanied with their children under 2 years old representing about 10% of total participants (36435) attended to maternal and child health centers in Obour City, Qalioubiya Governorate with confidence level 95% according to the following equation:

$$n = \frac{N \times p(1-p)}{\left[\left[N - 1 \times \left(d^2 \div z^2 \right) \right] + p(1-p) \right]}$$

Where:

n=Sample size

z: The standard score

d: The error rate

p: Property availability and neutral ratio

n=Size of population

Tools of data collection: The data in this study were collected by using two tools:

Tool I: Structured interview questionnaire for mothers was prepared by the investigators after reviewing the recent related literature and the content validity by the supervisors. This tool is divided into five parts:

▪ **Part I:** it was concerned with socio demographic characteristics of the mothers as regards: age, occupation, level of education, father level of education, marital status, family members, family type, family income and their children socio demographic characteristics were included as: sex, age and birth order.

▪ **Part II:** it was concerned with health history of children, health needs and health problems, divided into:

A. Health problems of the child as regards: Is the child having a chronic illness? If yes, chronic illnesses are...have an infectious disease, the presence of congenital malformations in the child, surgery performed to correct congenital malformations, if yes, surgery performed as....

B. Children health needs as regards: gestational age at birth, single/multiple birth, feeding, age at introduction of any foods or fluids and weaning.

▪ **Part III:** it was concerned with mothers' knowledge regarding routine immunization for their children during the Covid-19 pandemic such as: Are routine vaccinations safe for child?, routine vaccinations are given to children for importance of vaccination for child, dates for giving the routine doses of vaccinations to child, contraindications to routine vaccinations for a child, what are the symptoms of corona

disease that can appear on a child?, routine vaccinations give the child immunity against corona, are children under two years of age at risk of contracting corona infection?, corona virus can be transmitted to the child or mother during the vaccination visit by...

➤ **Scoring system for mothers' knowledge:**

It scored as following: the good answer = 3, fair answer = 2, and poor answer = 1. According to the mothers' responses, their level of knowledge was categorized as following: Satisfactory ($\geq 75\%$) and Unsatisfactory ($<75\%$).

▪ **Part IV:** It was concerned with mothers' reported practices regarding routine immunization for their children during the COVID-19 pandemic and protective measures for their children during the COVID-19 pandemic such as: What do you do to avoid corona infection while waiting for vaccine your child and when you return home after vaccination, what do you do to avoid the transmission of corona infection to your home?.

➤ **Scoring system for mothers' reported practices:**

It scored as following: done =2, not done=1, classified into adequate ($\geq 75\%$) while ($<75\%$) consider inadequate.

➤ **Part V:** it was concerned with mothers' perception regarding routine immunization for their children during the COVID-19 pandemic such as: Routine vaccinations are important for the health and immunity of the child; a mandatory routine vaccination program is beneficial to the community, vaccination reduces the risk of death or illness of a child; it is better for the child to have immunity to diseases without vaccinations; and you feel safe after your child is vaccinated.

➤ **Scoring system for mothers' perception:**

For the performance item related to mothers' perception score (1) Disagree, (2) Neutral, (3) Agree. The total perception equal

100%, more than 50% was considered positive and equal or less than 50% was considered negative.

Tool II: Anthropometric measures for children adopted from the *WHO, (2021)* and modified by researchers. Anthropometric measures such as: weight, height, body mass index (BMI)

- Infant is weighed without shoes and wearing light underclothing and a clean diaper on a calibrated electronic scale, the infant centered on the scale tray and the weight was written on the infant's chart. Infant length is measured on a calibrated length board without shoes, the assistant measurer holds the infant's head so the infant is looking upward and the crown of the head is against the headpiece. The measurer aligns the infant's trunk and legs, extends both legs, and brings the footboard firmly against the feet.

➤ **Scoring system for children body mass index (BMI):**

It scored according to the (BMI) chart as following: Obese (above 3), Overweight (above 2), Risk of overweight (above 1), Normal (1: - 1), Wasted (below -2), Severely wasted (below -3).

II. Operational Design:

Tools' validity:

Content validity of the proposed tools was evaluated to determine clarity, comprehensiveness, appropriateness and relevance of each item to be included in the questionnaire. After the construction of data collection tools (questionnaire sheets), the content validity of the tools was judged by a panel of three experts, having experience in family and community health nursing, Faculty of Nursing, from academic staff at the Ain Shams University. Based on their recommendations corrections, additions and/or omissions of some items were done.

Reliability of the Tools:

The reliability of the study tools was tested to determine the extent to which items in the tools were related to each other by

Cronbach's co-efficiency alpha for the questionnaire ($\alpha=0.97$). Pearson correlation co-efficiency was done to test the internal consistency ($r=0.02-0.98$) for all items of the tools. **Cronbach's Alpha** for health problems' needs was 875. reliability of knowledge was 646. Reliability of practice was 911. Reliability of perception was 783.

Pilot study:

A pilot study carried out on 10% of the sample size (38 mothers) of the main study subjects and before starting fieldwork and data collection. A pilot study was done for testing the feasibility and the clarity of questionnaire sheets, and their relevance to study. It also helped to estimate the time needed to complete the data collection forms. It took around 15-30 minutes to fill in the sheets. Those pilot study respondents were included in the main study sample as no modifications were done.

Ethical considerations:

Prior to the actual work of research study, ethical approval was obtained from the Scientific Research Ethical Committee at the Faculty of Nursing, Ain Shams University. In addition, a written consent was obtained from mothers who agreed to participate in the study after explaining its aim. Privacy was assured, also, ethics, values, cultural beliefs were respected and the subjects were informed about their right to withdraw at any time without giving any reason and that the collected data will be kept confidential and used for the research purposes only.

Field work:

- An official permission including the title and purpose of the study was submitted from the Dean of the Faculty of Nursing, Ain Shams University and directed to the Director of Obour City health units in order to get approval for data collection, which was forwarded to the directors of El-Mostakbal MCH, El-Shabab MCH, the 1st district MCH and El-Tarfihay MCH center, where the study was conducted.
- The field work of the study extended through 6 months.
- Data collection was carried out in the period from the beginning of March 2022 and was

completed by the end of August 2022, after securing the official approval for conducting the study.

- The researchers met the directors of the maternal and child health care centers in Obour City to determine the suitable time for data collection and seek their support.
- The researchers introduced themselves to mothers at the MCH centers and collected data three days weekly (Sundays, Mondays & Thursdays) from 9.00 a.m. -1.00 p.m. at appropriate time of mothers.
- The researchers distributed the tools to participants and asked them to fill them after clarifying the aim of the study and its implications.
- Data were collected through using the study tools by the researchers; and clarifications were given whenever they were needed with reassurance about confidentiality of any obtained information.
- The researchers checked each filled questionnaire to ensure its completeness.

III. Administrative Design:

Before starting on the study, official and formal letters were issued from the Faculty of Nursing, Ain Shams University to the Directors of the study settings, explaining the aim of the work, the expected benefits and ensuring confidentiality of the information obtained. Individual written consent was also obtained from each participant in the study.

IV. Statistical Design:

The collected data were tabulated and analyzed by (the Statistical Package for the Social Science (SPSS) software version 22, on IBM compatible computer. Graphics were done using Excel program.

Two types of statistics were done:

1) *Descriptive statistics*: were expressed as mean and standard deviation (Mean \pm SD) for quantitative data or number and percentage (No & %) for qualitative data.

2) *Analytic statistics*:

Chi-square test (χ^2) was used for comparisons between qualitative variables; and Spearman correlation analysis was used for assessment of the inter-relationships among quantitative variables.

P-value was used to determine significance as follows:

- P-value $>$ 0.05 to be statistically insignificant.
- P-value \leq 0.05 to be statistically significant.
- P-value \leq 0.001 to be highly statistically significant.

Results

Table (1): shows that, 55.3% of studied sample age was 30-<40 with a mean age of 36 ± 4.1 years and were working, 80.3% of them were married. Regarding to level of education an equal percentage of 26.3% of mothers had either secondary education or basic education, 51.6% of them were 3 as family members and 82.1% were nuclear families. Concerning for 51.3% of them, the monthly income was insufficient.

Table (2): shows that for 23.2% of studied children's age ranged between one day to less than two months. As well, 53.2% of them were boys. Regarding to infants' rank, 51.6 % of them were first.

Table (3): illustrates that regarding children feeding shows that 63.2% of them were breast feeding and 44.0% were partial weaning, while 51.3 % of the children introduced food or fluids at the age 4 to 6 months. Also 5.0% of children suffering from chronic illness and 31.5 % & 26.3% suffering from respiratory diseases and juvenile diabetes respectively, 11.1% only from children had congenital malformations. Also, 28.6 had surgery as correct the curvature of the legs and ear surgery.

Table (4): indicates that, 5.0% of children were suffering from a chronic illness,

and 31.5 % and 26.3% were suffering from respiratory diseases and juvenile diabetes respectively. As well, 11.1% only from children had congenital malformations, and an equal percentage of 28.6% had surgery to correct the curvature of the legs and ear surgery.

Figure (1): illustrates that, 69.7% of studied children their weight were normal while 14.25 were 8 Risk of overweight and (7.9%,7.1% &1.1%) respectively were Overweight, Wasted (below -2) and Obese (above 3).

Table (5): Demonstrates that according to the routine vaccinations' safety for child, as reported by 87.1% of mothers, they are very safe, and 52.6% mentioned that routine vaccinations are given to children for prevention of viral diseases only. Regarding the importance of vaccination for children, 97.9% of mothers reported that vaccination reduces the risk of infectious diseases. Concerning the dates for giving the routine doses of vaccinations to child, 75.8% of mothers reported that only upon completion of the exact age specified for the dose, while 50.5% mentioned that a severe deterioration in the health of the newborn is considered from contra-indications to routine vaccinations for a child.

Figure (2): clarifies that, 55.8% of studied mothers had unsatisfactory knowledge regarding their total knowledge, while 44.2% only had satisfactory total knowledge.

Table (6): shows mothers' practices regarding routine immunization for their children during the COVID-19 pandemic. It reveals that 75.8% of mothers' children received compulsory vaccinations after birth, while 27.9% of them avoided vaccinating their children when having high temperature before vaccination, and 33.9 % go to the next dose of vaccine when they forgot a vaccine and 43.4% were keen to complete all doses during the

pandemic. However, when child is suspected of being infected with corona at the time of vaccination, 25.5% of mothers didn't postpone the vaccination even if there are respiratory symptoms.

Figure (3): clarifies mothers' total practices, it shows that, 66.1% of them had done routine vaccinations for their children during the COVID-19, while, for 33.9% they were not done.

Table (7): clarifies mothers' perception regarding the protective measures and the MCH policy during routine immunization. It reveals that, 82.1% disagree about child should wear a face shield while going for vaccinations. Moreover, 72.9% of them disagree about the family health center, while 63.7% of them agree about trust the instructions of the medical team at the family health center, 83.2% of studied mothers agree about routine vaccinations are important for the health and immunity of the child, 76.8% of them agree about vaccination reduces the risk of death or illness of a child, 57.9% disagree about the child to better have immunity to diseases without vaccinations.

Figure (4): denotes that, 65.8% of studied mothers' had positive perception toward protective measures during routine immunization for their children and the MCH policy during the COVID-19 pandemic. However, 34.2% of them had negative perception regarding MCH policy during the COVID-19 pandemic.

Table (8): shows that there was a highly statistically significant difference between mothers' total knowledge and their total practices ($X^2=7882$ at p-value <0.001).

Table (9): reports that there was a highly statistically significant difference between mothers' total perception and their total practices ($X^2=49.686$ at p-value <0.001).

Part I: Demographic Characteristics of Mothers & Children (Tables 1&2)

Table (1): Frequency Distribution of Mothers Regarding their Demographic Characteristics (n= 380).

Mothers' Characteristics	No	%
Age/years		
<20	26	6.8
20-<30	64	16.8
30-<40	210	55.3
≥40	80	21.1
Mean ± SD 36±4.1 years		
Occupation		
Work	210	55.3
Don't work	170	44.7
Mothers' education		
Don't read or write	20	5.3
Read and write	30	7.9
Basic Education	100	26.3
Secondary education	100	26.3
University education	130	34.2
Fathers' education		
Don't read or write	16	4.2
Read and write	50	13.2
Basic education	108	28.4
Secondary education	77	20.3
University education	129	33.9
Marital status		
Married	305	80.3
Widowed	5	1.3
Divorced	70	18.4
Number of family members		
- 3	196	51.6
- 4	82	21.6
- 5 or more	102	26.8
Family type		
Nuclear	312	82.1
Extended	68	17.9
Income/month		
Sufficient	185	48.7
Insufficient	195	51.3

Table (2): Frequency Distribution of Children Regarding their Characteristics (n=380).

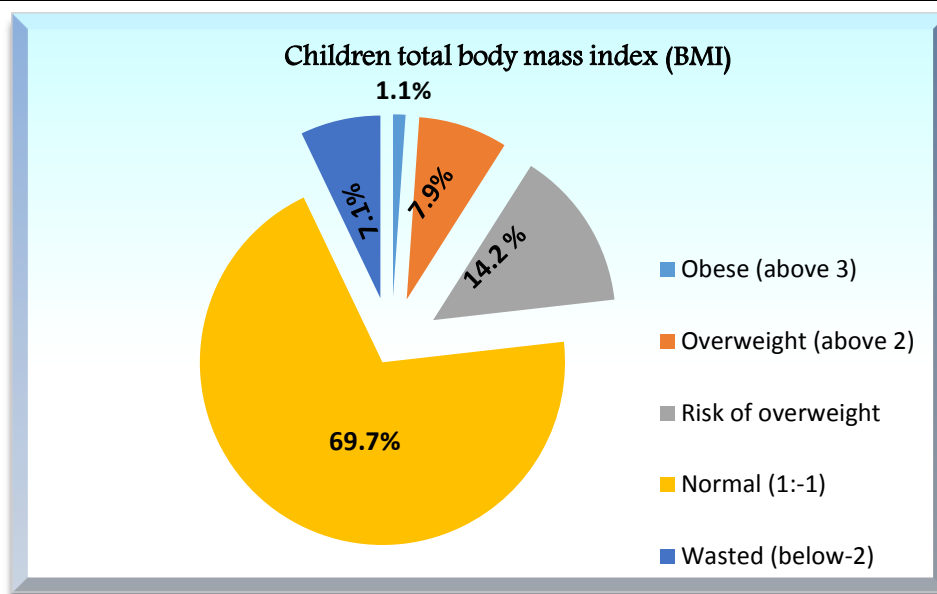
Children's characteristics	No	%
Gender		
Boy	202	53.2
Girl	178	46.8
Children's age:		
One day to less than two months	88	23.2
Two months to less than four months	60	15.8
Four months to less than 6 months	49	12.9
6 months to less than 9 months	52	13.7
9 months to less than 12 months	70	18.4
12 months to less than a year and a half	30	7.8
One year and a half to two years	31	8.2
Baby rank:		
First	196	51.6
Second	82	21.5
Third	55	14.5
Fourth and following	47	12.4
Infant term		
Full term	303	79.7
Preterm	77	20.3
Type of birth:		
Single birth	371	97.6
Multiple birth	9	2.4

Part II: Assessment of Health Needs and Health Problems Children Under 2 Years (tables 3,4)**Table (3):** Distribution of the studied children according to their health needs (n=380)

Child health needs	No	%
Feeding:		
Breast feeding	240	63.2
Formula	90	23.7
Both	50	13.1
Weaning:		
Partial weaning	167	44.0
Complete weaning	73	19.2
Not started weaning	140	36.8
Age at introduction of any foods or fluids:		
under 4 months	85	23.0
4 to 6 months	195	51.3
More than 6 months	100	26.0

Table (4): Distribution of the Studied Children Regarding their Health Problems History (n=380).

Items	No	%
Have a chronic illness for the child		
Yes	19	5.0
No	361	95
If yes, chronic illness are: (n=19)		
Chronic respiratory diseases	6	31.5
Juvenile diabetes	5	26.3
Heart diseases	3	15.8
Leukemia	1	5.3
Hemophilia	1	5.3
Infectious diseases		
Hepatitis C virus	1	5.3
Corona virus	3	15.8
The presence of congenital malformations in the child:		
Yes	42	11.1
No	338	88.9
Surgery performed to correct congenital malformations		
Yes	7	1.8
No	373	98.2
Surgery performed such as (n=7)		
Repair heart septal defect	1	14.3
Surgery to correct the curvature of the legs	2	28.6
Surgery of the undescended testicle	1	14.3
Ear surgery	2	28.6
Cleft lip correction surgery	1	14.2

**Figure (1):** Distribution of the Studied Children According to Their Total Body Mass Index (BMI) (n=380).

Part III: Assessment of Mothers' Knowledge Regarding Routine Immunization for Their Children During the COVID-19 Pandemic (tables 5; figure 2).**Table (5):** Frequency of Mothers' Knowledge Regarding Routine Vaccinations for their Children (n=380).

Items	Yes		No	
	No	%	No	%
Are routine vaccinations safe for child?				
Vaccinations are very safe	331	87.1	49	12.9
The harm caused by vaccinations to the child is greater than the harm caused by exposure to the disease itself.	2	0.5	378	99.5
Routine vaccinations are given to children for:				
Prevention of viral diseases only	200	52.6	180	47.4
Protection from bacterial and viral diseases	154	40.5	226	59.5
Prevention of parasitic diseases	26	6.8	354	93.2
Importance of vaccinations for child:				
Vaccinations prevent infectious diseases that can infect the child	3	0.8	377	99.2
Vaccinations strengthen the immune system of the child	5	1.3	375	98.7
Vaccinations reduce the risk of infectious diseases	372	97.9	8	2.1
Dates for giving the routine doses of vaccinations to child?				
Only upon completion of the exact age specified for the dose	288	75.8	92	24.2
It can be given shortly before completing the specified age	67	17.6	313	82.4
Contra-indications to routine vaccinations for a child:				
Diarrhea and a slight rise in temperature	30	7.9	350	92.1
A severe deterioration in the health of the newborn	192	50.5	188	49.5
What are the symptoms of corona disease that can appear on a child?				
Fever and diarrhea	24	6.3	356	93.7
Pain in the throat	45	11.8	335	88.2
Fatigue and exhaustion	55	14.5	325	85.5
Loss of sense of smell and taste	16	4.2	364	95.8
Routine vaccinations give the child immunity against corona	85	22.6	295	77.6
Are children under two years of age at risk of contracting corona infection?	331	87.1	49	12.0
What should you do if your child confirmed to have contracted the coronavirus at the time of vaccination?				
delay in his routine vaccination	44	11.6	336	88.4
To be vaccinated	211	55.5	169	44.5
Corona virus can be transmitted to the child or mother during the vaccination visit by:				
Respiratory droplets resulting from coughing and sneezing.	4	1.1	376	98.9
Hugging, shaking hands and talking to anyone at a distance of less than one meter	5	1.3	375	98.7

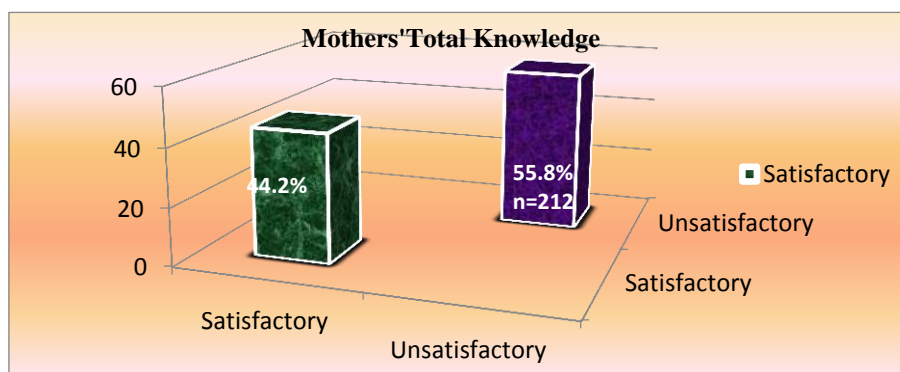


Figure (2): Percentage Distribution of Mothers Regarding Their Total Knowledge

Part IV: Assessment Mothers Practices Regarding Routine Immunization for their Children during the COVID-19 Pandemic (Tables 6; Figures 3).

Table (6): Frequency of Mothers' Practices Regarding Routine Immunization for Their Children (n=380).

Items	Yes		No	
	No	%	No	%
Child receives obligatory vaccinations immediately after birth?	288	75.8	92	24.2
What do you do when a child has a high temperature before vaccination?				
• Avoid vaccinating the child	106	27.9	274	72.1
• Give antipyretic	62	16.3	318	83.7
• Contact the doctor	38	10.0	342	90.0
• Stop breastfeeding	17	4.5	363	95.5
When you forget to vaccinate, what do you do?				
• Go to the health center	112	29.5	268	70.5
• Ignoring the matter	39	10.3	341	89.7
• Go to the next vaccination	129	33.9	251	66.1
Have you ever made an appointment for your child's vaccination reimbursement with the doctor?	37	9.7	343	90.3
Keen to complete all vaccination doses when there is more than one dose during the pandemic?	165	43.4	215	56.6
What do you do when a child has a high temperature after vaccination?				
• Make cold compresses	119	31.3	261	68.7
• Giving a strong antipyretic	55	14.5	325	85.5
• Nothing, because it is normal	129	33.9	251	66.1
If redness and tenderness in site of injection				
• I should contact the doctor because it is dangerous	78	20.5	302	79.5
• Apply warm water compresses to the injection site	162	42.6	218	57.4
Have you adhered to the mandatory vaccination dates for your infant during the Corona pandemic?	293	77.1	87	22.9
When your child is suspected of being infected with corona at the time of vaccination. What do you do?				
• Contact your physician	28	7.4	352	92.6
• Go for vaccinations if the symptoms are mild	36	9.5	344	90.5
• Postpone the vaccination until recovery	39	10.3	341	89.7
What do you do to avoid Corona infection while waiting for vaccinate your child?				
• Be sure to wear a mask, use disinfectants, maintain social distancing, and avoid shaking hands with people	111	29.2	269	70.8
• I don't care my child and I have been infected with corona before and we have immunity	48	12.6	332	87.4
When you return home after vaccination, what do you do to avoid the transmission of corona infection to your home?				
• Get rid of the mask the right way	66	17.4	314	82.6
• Wash my hands, face and clothes, me and my child, with soap and water	78	20.5	302	79.5

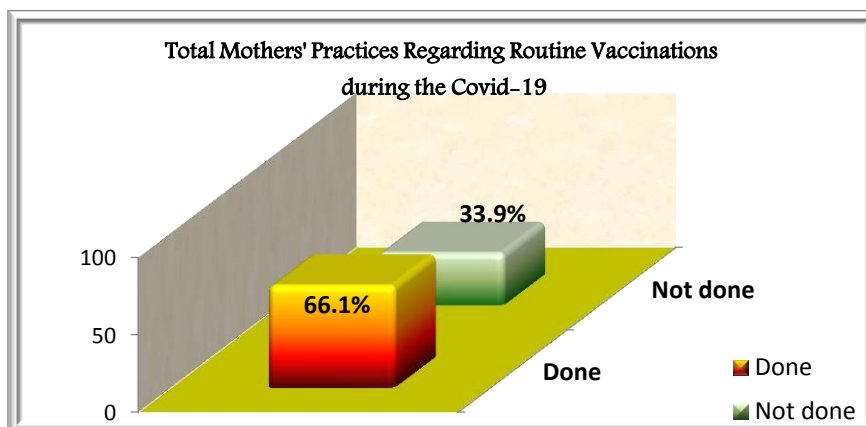


Figure (3): Frequency Distribution of Mothers' Total Practices Regarding Routine Vaccinations for the Children during the COVID-19 Pandemic.

Part V: Mothers' perception regarding the protective measures and the MCH policy (tables 7; figure 4).

Table (7): Frequency of Mothers' Perception Regarding the Protective Measures and the MCH Policy during Routine Immunization for Their Children Regarding the COVID-19 Pandemic.

Items	Agree		Neutral/ Don't know		Disagree	
	No	%	No	%	No	%
Routine vaccinations are important for the health and immunity of the child	316	83.2	64	16.8	0	0.0
A mandatory routine vaccination program is beneficial to the community.	364	95.8	0	0.0	16	4.2
Vaccination reduces the risk of death or illness of a child	292	76.8	80	21.1	8	2.1
It is better for the child to have immunity to diseases without vaccinations	160	42.1	0	0.0	220	57.9
You feel safe after your child is vaccinated	309	81.3	60	15.8	11	2.9
The fear of going to vaccinate children during the Corona pandemic is unreasonable.	290	76.3	10	2.6	80	21.1
A child should wear a face shield while going for vaccinations.	64	16.8	4	1.1	312	82.1
Vaccination increases the risk of corona infection for a child	60	15.8	11	2.9	309	81.3
In my opinion, the family health center that I go to has provided me and my child with enough preventive measures to deal with the Corona pandemic.	100	26.3	3	0.8	277	72.9
I have enough knowledge about the coronavirus to deal with it.	203	53.4	7	1.9	170	44.7
In my opinion, wearing a face mask, using disinfectants, and adhering to social distancing can protect me and my child from infection with corona during vaccination.	310	81.6	10	2.6	60	15.8
I trust the instructions of the medical team at the Family Health Center.	242	63.7	8	2.1	130	34.2
I trust the quality of the vaccinations at the Family Health Center.	207	54.5	3	0.8	170	44.7

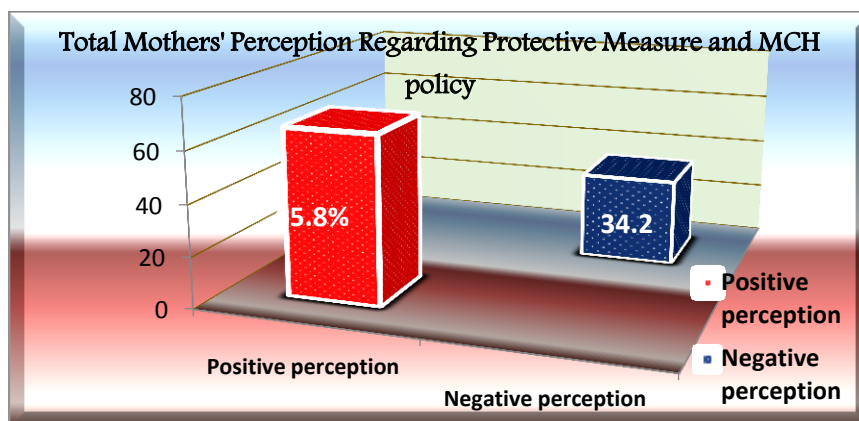


Figure (4): Frequency of Mothers' Total Perception regarding the Protective Measures and the MCH Policy Regarding Routine Immunization for the Children during the COVID-19 Pandemic

Part VI: Association between Mothers' Total Knowledge, Practices & Perceptions (tables 8-9).

Table (8): Association between Mothers' Total Knowledge & Their Total Practices (n=380).

Total Knowledge	Total Practices				Chi-Square test	
	Not done		Done		X ²	P
	No	%	No	%		
Unsatisfactory 212	82	63.6	130	51.8	4.7882	0.0286*
Satisfactory 168	47	36.4	121	48.2	df (1)	

Table (9): Association between Mothers' Total Practices & their Total Perception (n=380).

Total Perception	Total Practices				Chi-Square test	
	Not done 129		Done 251		X ²	P
	No	%	No	%		
Negative 130	75	58.1	55	21.9	49.686	0.0*
Positive 250	54	41.9	196	78.1	df (1)	

Discussion

Vaccination is one of the most useful scientific interventions which have been proved for controlling many infectious diseases and has helped to eradicate some diseases. The World Health Organization (WHO) has stated that routine immunization programs have been substantially disrupted in at least 68 countries, affecting more than 80 million children worldwide, especially in poor countries. The reduction of child vaccination coverage, even for brief periods during emergencies, could cause an increased number of susceptible individuals and raise the risk of outbreak-prone vaccine preventable diseases such as measles, polio, and pertussis (*World Health Organization, 2020*). So, this study aimed to assess mothers' perception regarding routine immunization for their children during the COVID-19 Pandemic

The current study detects that, for more than half of the studied sample, age was 30-40 with a mean of age of 36 ± 4.1 years, were working, and the majority of them were married. Regarding to level of education more than one quarter of mothers had secondary or basic education and the majority of them were nuclear families. Concerning monthly income, for slightly more than half of them it was insufficient. The present study results were supported with those of

Abraham et al. (2020), carried out a study, in India, among 140 women entitled "Knowledge and perceptions regarding immunization among mothers of under age five children: A community study from South Kerala", they mentioned that, 77.9% of their studied sample were nuclear families.

However, these results were in disagreement with those of *Alsuhaibani and*

Alaqeel, (2020), who conducted study in Saudi Arabia among 749 participants entitled "Impact of the COVID-19 pandemic on routine childhood immunization in Saudi Arabia", they found that, for 49.8% of the studied sample their age ranged between 31–40 years, and 78.4% of them obtained a bachelor's degree.

Regarding their children's socio-demographic data, the present study result showed that, less than one quarter of studied children their age was one day to less than two months. As well, more than half of them were boys. The present study findings go in the same line with that of *Khalil and Mohamed, (2020)*, who conducted a study in Egypt, among 126 mothers, entitled "Knowledge, attitude, and practices of mothers towards children immunization during COVID-19 pandemic" and they found that, 67.4% of the studied children were boys, while it disagrees in relation to age, as 66.2% of them were above 12 months and the rest below 12 months.

As regard to health needs of the studied child, the present study result illustrated that regarding children feeding less than two thirds of them were breast feeding and more than two fifths were partial weaning, while more than half of the children introduced food or fluids at the age 4 to 6 months. This result was in disagreement with *Abbas et al., (2021)* who applied study in India among 232 participant entitled "Covid-19 and Routine Vaccination Programme: Did it Affect Badly?" found that 44% of the studied child were formula milk. From the investigator point of view this result depend on mothers' awareness related to child needs and mothers' attitude about how to deal with their needs.

Concerning health problems of the studied children, the present study reveals that, less than one tenth of the studied children have chronic illness and less than one third from those who have chronic diseases suffered from respiratory diseases. These results matched with those of *Abdalla et al. (2022)*, who conducted study in Saudi Arabia among 436 studied sample entitled "Assessment of parent's knowledge and perception towards the importance of child immunization in Saudi

region, Saudi Arabia" and they found that, 91% of children do not have any chronic diseases, while 6% of children are suffering from asthma, and 1.1% of them suffered from respiratory diseases.

As regards mothers' knowledge regarding routine immunization for their children, majority of mothers under study said that the immunization was very safe. More than half of them reported prevention of viral diseases only; almost half of them stated that a severe deterioration in the health of the newborn is considered from contra-indications to routine vaccinations for the child. Most of them mentioned that vaccinations reduce the risk of infectious diseases and slightly more than three quarters of them reported that they give routine doses for vaccinations only upon completion of the exact age specified for the dose. The present study results were in accordance with those of *Almutairi et al., (2021)*, who carried out a study in Saudi Arabia, among 262 participants entitled "Assessment of mothers' knowledge, attitudes, and practices regarding childhood vaccination during the first five years of life in Saudi Arabia", which revealed that, 90% of the studied participants said vaccinations prevent infectious diseases, 97% reported vaccinations keep children healthy, 93% vaccinations reduce death and disability and even a healthy child needs vaccinations.

In relation to total knowledge of the studied mothers, the current study result clarified that more than half of studied mothers had unsatisfactory knowledge regarding COVID-19 pandemic. This result was in accordance with that of *Khalil and Mohamed, (2020)*, who revealed that, 46.0% of the studied mothers had a good level of knowledge, while this result contrasted with that of *Sankar et al. (2020)*, who conducted a study entitled "A study to assess and correlate the knowledge, attitude and practices of vaccination among mothers with educational status in a Teaching Hospital in South India" and found that, among 143 mothers, 50.43% had excellent knowledge, whereas 34.3% had average knowledge and 15.4% of them had poor knowledge. From the researchers' point of view, the result of the present study could be due to that mothers' lack

of awareness about the importance of child immunizations during COVID-19, also they needed more education and reading about COVID-19, also it is a novel infectious disease. As well, social media should play an important role being intensive and sustained, in increasing mothers' awareness about COVID-19 pandemic.

According to mothers' practices regarding protective measures for their children during the COVID-19 pandemic, the current study results showed that, the majority of mothers didn't get rid of the mask by the right way, and three quarters of them didn't care washing their hands with soap and water, and their clothes and those of their children as well. These results contrasted with those of *Almoosa et al. (2020)*, who in their study done in Saudi Arabia, among 494 respondents who participated in this study entitled "Impact of Corona Virus Disease pandemic on routine pediatric vaccination in Eastern Region, Saudi Arabia", found that 86.2% of the studied mothers were wearing masks, 44.7% of them were wearing gloves, 90.5% of them maintained social distancing; 89.3% of them maintained hand hygiene after touching materials, also mentioned, decided to delay the vaccination till the end of the COVID-19.

Concerning mothers' total practices regarding routine vaccinations for the children during the COVID-19 pandemic, the current study result clarified that, two thirds of mothers' practices were done regarding routine vaccinations during the COVID-19. In this respect, *Sankar et al. (2020)* in a similar study, found that, among 143 mothers, 55% of them had excellent practice scores, while 44.8% of them had average practice and none of them had bad practice regarding vaccination administration. From the researchers' point of view, the result of the present study could be due to that the mothers' knowledge about the importance of immunization during COVID-19 pandemic was unsatisfactory for more than half of them which in turn affected their practices.

Concerning mothers' perception regarding the protective measures and the MCH policy during routine immunization, the current study result revealed that, the majority of them

disagreed about child should wear a face shield while going for vaccinations. Moreover, less than three quarters of them disagreed about the family health center where mothers go to has provided them and their children with enough preventive measures to deal with the Corona pandemic. Less than two thirds of them agreed about trusting in the instructions of the medical team at the family health center.

This result was in disagreement with that of *Khalil and Mohamed, (2020)*, who mentioned that, about 65.1% of the studied mothers strongly agreed in relation to the child wears a face shield when going to immunization. However, this result was in accordance with that of *Eller et al. (2019)*, who conducted study in Washington State among 391 participants entitled "Vaccine information sources and parental trust in their child's health care provider" they found that mothers with less trust in their child's health care provider used more sources, more informal sources, and were less likely to consider their child's pediatrician their main source of vaccine information compared with more trusting mothers.

As well, this study was in agreement with *Raof, (2020)*, who applied a study in Iraq, among 753 participants, entitled "Parental attitude and beliefs towards child vaccination: Identifying vaccine hesitant groups in a family health center, Erbil City, Iraq", which reported that, 83% of the studied women were trusting the information received from health care providers. From the researchers' point of view, this may be due to the fact that childhood immunization being such an important intervention capable of preventing debilitating diseases to children, public enlightenment on the subject has been intensive and sustained.

As regards mothers' total perception regarding the protective measures during routine immunization for their children and the MCH policy during the COVID-19 pandemic providers towards child vaccination, the present study result denoted that about two thirds of studied total mothers' perceptions were positive protective measures during routine immunization for their children and the MCH policy during the COVID-19 pandemic.

However, more than one third of them had negative perceptions regarding MCH policy during the COVID-19 pandemic. This result was in agreement with that of *Raof, (2020)*, who mentioned that, 66% the studied parents had positive perception regarding health care.

As regards association between mothers' total knowledge and their total practices, the current study result showed that there was a highly statistically significant difference between mothers' total knowledge and their total practices at p-value <0.001. This result was congruent with that of *Sinuraya et al. (2022)*, who found positive correlation at p-value <0.001 between participants' knowledge and practices, also it matched with that of *Matta et al. (2020)*, who in their study, in Lebanon, among 3500 participants, entitled "Parents' knowledge, attitude and practice towards children's vaccination in Lebanon" which by strengthening better knowledge was significantly associated with better practices.

Concerning association between mothers' total practice and perception, the current study result reported that, there were statistically significant differences between mothers' total perception and their total practices at (p-value <0.001). This result agreed with that of *Lamiya et al. (2019)*, who conducted a study, in India, among 235 mothers, entitled "Knowledge, attitude and practice among mothers of under five years of age on immunization" who found that, a significant relation was established between perception and practice.

Conclusion

Findings of this study concluded that there was lack of mothers' knowledge toward routine immunization, which in turn affected their practices and their perception regarding routine immunization and MCH policy during the COVID-19 pandemic. As well, there were highly statistically

significant relations in total score of knowledge and mothers' reported practices as well as mothers' perception regarding routine immunization for their children during the COVID-19 pandemic.

Recommendations

In the light of findings of the current study the following recommendations are suggested:

✓ Counseling session should be offered by community health nurses to upgrade parents' knowledge, practices and perception with special emphasis on less educated ones and residents of rural areas regarding vaccination during the COVID-19 pandemic.

✓ Development of an educational health program to teach the mothers the importance of continuing children vaccinations and following the universal precautions during the COVID-19 pandemic.

✓ Developing further research about measures to avoid backsliding of vaccination rates during further waves of COVID-19 pandemic or future pandemics.

✓ Further studies which include larger number of maternal and child health centers from different geographical areas to generalized results in Egypt.

References

- Abbas, J., Kumar, A., Saif, M., Malhotra, R. & Arif Hussain, M. (2021):* Covid-19 and routine vaccination programme: Did it affect badly? <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8855492>.
- Abdalla, S.M., Ahmad, M.S., Al-Baradie, N.S., Alshuwaiash, L.M., Al-Issa, R.A., & Alrashid i, S.S. (2022):* Assessment of parent knowledge and perceptions towards the importance of child immunization in Sudair region, Saudi Arabia. *European Review for Medical and Pharmacological Sciences*; 26(6), 1803-1808.
- Abraham, S.B., Thomas, T., M., R., & Abbas, H. (2020):* Knowledge and perceptions regarding immunization among mothers of under five children: A community study from South Kerala.

- International Journal of Contemporary Pediatrics; 7(1), 66-71.
- Almoosa, Z., Alhamoud, H.H., Alkhalaf, A.B., ALAabdullah, W.A., Alghafli, J.A., Albensaad, N.S. & Alghazal, Z.Y. (2020):** Impact of corona virus disease pandemic on routine pediatric vaccination in eastern region, Saudi Arabia. *Medical Science*; 24 (106), 4672-81.
- Almutairi, W.M., F., Khmis, F., Sallam, L.A., Sharif, L., Alsufyani, A. & Alqasimi, R. (2021):** Assessment of mothers' knowledge, attitudes, and practices regarding childhood vaccination during the first five years of life in Saudi Arabia. *Nursing Report*, 11 (3), 506-516.
- Alsuhaibani, M. & Alaqeel, A. (2020):** Impact of the COVID-19 pandemic on routine childhood immunization in Saudi Arabia. *Vaccines*; 8(4), 581.
- Bello, I.M., Lebo, E., Shibeshi, M.E., Akpan, G., Chakauya, J., Masresha, G. & Daniel, F. (2021):** Implementation of integrated supportive supervision in the context of coronavirus 19 pandemic. *Pan African Medical Journal*; 38(164). 10.11604/pamj.2021.38164.27349.
- Bimpong, K.A., Nuertey, B.D., Seidu, A.S., Ajinkpang, S., & Abdul-Mumin, A. (2021):** Decline in uptake of childhood vaccinations in a tertiary hospital in Northern Ghana during the COVID-19 pandemic. *Bio Med Res Int*; e6995096.10.1155/2021/6995096.
- Eller, N.M., Henrikson, N.B. & Opel, D.J. (2019):** Vaccine information sources and parental trust in their child's health care provider. *Health Education & Behavior*; 46(3), 445-453.
- Fakonti, G., Hadjikou, A., Tzira, E., Kyprianidou, M. & Giannakou, K. (2022):** Attitudes and perceptions of mothers towards childhood vaccination in Greece: Lessons to improve the childhood COVID-19 vaccination acceptance. *Front Pediatr*. Aug 25;10:951039. doi: 10.3389/fped.2022.951039. PMID:36090549; PMCID: PMC9453258.
- Ghareeb, A. & Mohamed, A. (2021):** Knowledge, attitudes, and practices of mothers towards children immunization during Covid-19, *Tanta Scientific Nursing Journal*; 22(10), e021446.
- Hussain, H. and Marzo, R.R. (2020):** A literature review of parental barriers to child immunizations. *J Crit Rev.*; 7(3), 642-6.
- Khalil, A. & Mohamed, A. (2020):** Knowledge, attitudes and practices of mothers towards children immunization during COVID-19 pandemic. *Tanta Scientific Nursing Journal*; 19(2), 112-126.
- Lamiya, K.K., Mundodan, J. M. & Haveri, S.P. (2019):** Knowledge, attitudes and practices among mothers of under five years children on immunization. *Int. J. Community. Med. Public Health*; 6,1252-1257.
- Mahalingam, S., Soori, A., Ram, P., Achappa, B., Chowta, M. & Madi, D. (2020):** Knowledge, attitudes and perceptions of mothers with children under five years of age about vaccination in Mangalore, India. *Asian Journal of Medical Science*; 5(4), 52-57.
- Matta, P., El Moullem, R., Akel, M., Hallit, S. & Fadous, K. (2020):** Parents' knowledge, attitude, and practice towards children's vaccination in Lebanon: role of the parent- physician communication. *BMC public Health*; 20 (1): 1439. doi:10.1186/s12889-020-09526-3.
- Noh, J.W., Kim, Y.M., Akram, N., Yoo, K.B., Park, J. & Cheon, J. (2019):** Factors affecting complete and timely childhood immunization coverage in Sindh, Pakistan; A secondary analysis of cross-sectional survey data. *PLoS ONE* 13(10), e0206766.
- Raof, A.M. (2020):** Parental attitude and beliefs towards child vaccination: Identifying vaccine hesitant groups in a family health center, Erbil City, Iraq. *World Family Medicine Journal*; Incorporating the Middle East Journal of Family Medicine; 99(6002), 1-10.
- Russo, R. and Bozzola, E. (2021):** Pediatric routine vaccinations in the COVID-19 lockdown period. *Italian Journal of pediatrics*.
- Sankar, B.K., Rameh, S. & Sunny, A. (2020):** A study to assess and correlate the knowledge, attitudes and practices of vaccination among mothers with educational status in a Teaching Hospital in South India. *Primary Health Care: Open Access*; 8(1), 1-6.
- Sinuraya, R.K., Kusuma, A.S., Pardoel, Z.E., Postma, M.J. & Suwantika, A.A. (2022):** Parents' knowledge, attitude, and practice on childhood vaccination during the COVID-19 pandemic in Indonesia. *Patient preference and adherence*, 16,105.
- United Nations Infants' Children's Emergency Fund (UNICEF) and World Health Organization (WHO) (2021a):** Egypt: WHO and UNICEF estimate of immunization coverage. <https://data.unicef.org/wp-content/uploads/2022/07/egy.pdf>.
- World Health Organization (WHO) (2020a):** Agencies call for joint effort to safely deliver routine immunization. Available at: <https://www.who.int/news/item/22-05-2020>.
- World Health Organization, (WHO) (2022):** Immunization coverage. 2021. Available online: <https://www.who.int/news-room/factsheets/detail/immunization-coverage> (accessed on 16 January 2022).