

## Factors Affecting Egyptian Mothers' Intentions to Vaccinate Their Children against COVID-19: A Cross Sectional Study in Egypt

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### Abstract

**Background:** The rapid increase in the COVID-19 cases among children needs more attention from health care workers especially nurses. The rapid expansion of vaccines covering children is an important factor for combating this catastrophic pandemic. **Aim:** to investigate factors affecting Egyptian mothers' intentions to vaccinate their children against COVID-19. **Subjects and Method: Design:** A descriptive cross-sectional design was utilized in this study. **Setting:** the study was carried out at pediatric outpatient clinics at Tanta University Hospital. **Subjects:** 1200 mothers who had children under the age of 18 were recruited to participate in this study. **Tool of the study:** A structured interview questionnaire that had three parts. The first part covered the socio-demographic characteristics of the mothers, the second part measured mothers' vaccination intention, factors affecting their intentions and the third part was assessing the mothers' trust in the recommended COVID-19 vaccination schedule. **Results:** The results indicated that nearly half of participated mothers (49%) were extremely unlikely to get their children vaccinated against COVID-19 and two thirds (64%) of them were hesitant to give the vaccine because they were afraid from the side effect of the vaccine on their children. **Conclusion:** The hesitant mothers in this study were concerned about the vaccine's side effects and this was the first factor the mothers consider when deciding to vaccinate their children. **Recommendations:** Pediatric nurses should understand factors prevent the mothers from vaccinating their children to be able to design and apply health education campaigns about the COVID-19 vaccine that target mothers.

**Keywords:** COVID-19, Egyptian Mothers, Factors, Intentions, Their Children, Vaccinate

## Introduction

Coronavirus disease 2019 (COVID-19) is a new disease that has been identified in December 2019 in China and it is caused by severe acute respiratory syndrome Coronavirus. <sup>(1)</sup> The World Health Organization (WHO) announced it as pandemic on 11 March 2020. <sup>(2)</sup> The disease affected all countries including Egypt, and children were affected like other age groups, but the total incidence in children was less than 10% according to WHO, 2020. <sup>(3)</sup> In the United States, around 17% of all cases of COVID-19 that reported to the Centers for Disease Control and Prevention (CDC) were children. <sup>(4)</sup>

Children infected with coronavirus are usually presented with mild to moderated symptoms such as fever, dry cough, nausea, vomiting and fatigue. The hospitalization rate usually low (<2%) and the death rate is around (<0.03%).<sup>(4,5)</sup> Despite the low risk that COVID-19 may have in children in the short-term, the long-term complications are of more concern. Some children may develop pediatric inflammatory multisystem syndrome after 2 to 6 weeks after COVID-19 infection. Different body parts in this syndrome become inflamed, include the lungs, heart, brain, eyes, skin, kidneys and gastrointestinal system. <sup>(6,7)</sup>

In addition, children with other underlying medical conditions such as asthma, heart disease, and kidney problems are at risk for severe illness resulting from COVID-19 compared to children without underlying medical conditions. Vaccination is one of the most significant public health measures to stop the spread of viral diseases and safeguard vulnerable populations, and ultimately save lives. Vaccination against COVID-19 is a critical tool to best protect every child from this disease and its related

complications. The CDC recommended that every child aged 5 years and older should get the COVID-19 vaccine. <sup>(8)</sup>

Despite the fact that vaccinations prevent children to catch dangerous diseases, there is still an increasing resistance to immunizing children, and different societies have varying degrees of hesitancy. Vaccine hesitancy was always an issue that considered by the WHO as a major threat to public health even before COVID-19 pandemic, and defined it as the refusal or reluctance of vaccines. <sup>(9)</sup> This hesitancy might be related to several factors such as convince issue of the vaccine, confidence issues (do not trust a provider of the vaccine), and complacency (do not perceive a need for a vaccine or do not value the vaccine). <sup>(10)</sup> These issues were related to general vaccine, in addition to these issues COVID-19 vaccine hesitancy was related more to worries regarding the vaccination safety and side effects. <sup>(11)</sup>

Vaccine hesitancy may lead to high anxiety levels among children's parents, and they may refuse having their children vaccinated. <sup>(12)</sup> Many factors such as fear about vaccine safety, risks of children becoming infected by the virus, and lack of information about vaccines affected parents' intentions and acceptance to COVID-19 vaccination program. Several studies reported mothers were less likely to be willing to vaccinate their children than fathers and usually mothers are the users of children's health care and the decision makers regarding their children's vaccination. So, it is important for pediatric nurses to understand mothers' intentions, and factors affecting this intention to reduce their vaccine hesitancy

and encourage them to give their children COVID-19 vaccine.

### **Significance of the study**

Children's physical, general well-being and education are negatively affected by the Covid-19 epidemic. The vaccination of children against it is the best method to decrease the disease burden and to enable the students to go back safely to school, other social activities, and safeguard their futures. Studies show hesitancy among parents to vaccinate their children even when they have vaccinated themselves.<sup>(13)</sup> According to estimates, one in five parents are reluctant to get the Covid-19 vaccine.<sup>(11)</sup>

Parents have difficulty understanding and validating the information about the vaccine that they receive from different resources and view the health care professionals specially nurses as valuable source of information.<sup>(14)</sup> Knowing the factors that affect the Egyptian mothers' intention to vaccinate their children will help the pediatric nurses to design programs to target the reasons for hesitancy and encourage the mothers to vaccinate their children. there was no study to date done in Egypt that investigated the factors that affect mothers' intentions to vaccinate their children against Covid-19. So, the aim of this study was to assess factors affecting Egyptian mothers' intentions to vaccinate their children against COVID-19.

**The aim of the present study was to:-** Investigate factors affecting Egyptian mothers' intentions to vaccinate their children against COVID-19.

### **Research question**

What are the factors affecting Egyptian mothers' intentions to vaccinate their children against COVID-19?

## **Subjects and Method**

### **Research design:**

A descriptive cross-sectional design was used in the present study.

### **Setting:**

Participants for the research were recruited from the pediatric outpatient clinics of Tanta University Hospital. The pediatric outpatient clinics consist of Endocrine clinic, Neurology clinic, Ear, Nose, Throat clinic(ENT) , chest and nutrition clinic

### **Study subjects**

A convenience sampling of 1200 mothers was included in the present research. The inclusion criteria were mothers of children under 18 years old. The sample size for the study was estimated using the Raosoft sample size calculator.

### **Data collection Tools**

Data was collected using a structured interview questionnaire that consisted of 3 parts. The first part covered the socio-demographic characteristics of the participants and was developed by the researchers. It included items such as age, marital status, employment status, educational level, number of children, and receiving the vaccination for COVID-19. The second part measured participants' vaccination intention and factors affected their intentions. Participants' intention was measured by one question. The assessment of the factors that affect mothers' intentions was measured by 2 instruments. The first one is developed by the researchers after an extensive review of the available literatures.<sup>(9,10)</sup> It has 9 questions that assess the participants' factors that affect their COVID-19 intentions. The questions related to the vaccine side effects, safety, lack of trust in vaccine information, and having enough information about the vaccine. The Cronbach's alpha for this instrument was =

0.88. The second instrument was adopted from **Wong et al. (2021)**.<sup>(15)</sup> This instrument had questions related to mothers' COVID-19 past vaccine behavior and characteristics influencing their vaccination intention. The Cronbach's alpha for this instrument was estimated to be = 0.89.

The third part was assessing the participants' trust in the recommended COVID-19 vaccination schedule. It was assessed by **Opel et al. (2011)**.<sup>(16)</sup> It uses a 10-point rating scale ranging from (0) = no trust at all to (10) = totally trust. (Cronbach's  $\alpha$  = 0.86).

### **Method**

Data collection started at the beginning of October 2021 and ended in March 2022. Before starting the data collection process, official permission to initiate the study was gained from the director of Tanta University Hospital. Oral consent was gained from the participants after giving detailed information about the study. The participants were assured that all the information collected is confidential and used only for purpose of the research. The nature of the research did not cause any harm or pain to the mothers and were assured that they can withdraw from the study at any time without any consequences. The study questionnaire was tested for content validity by experts in the field of pediatrics nursing. Modifications were carried out accordingly. The questionnaire's face validity was calculated based on experts' opinions after calculating the content validity index of its items and it was 94.8%. Also, a pilot study was initially performed before the actual data collection phase on 10% of the calculated sample to check the questionnaire feasibility, clarity, and applicability and identify potential

barriers that may exist during the data collection process. The English versions of the questionnaire were translated and back-translated to Arabic .

The researchers were available in the outpatient clinics of Tanta University Hospital in the morning during clinic time to meet the mothers and ask them to participate in the study. Data was collected through face-to-face interviews to ensure a higher response rate, to include illiterate participants, and to clarify misunderstood questions. Each interview took about 15-20 minutes. The questions were directed in simple Arabic language and the answers were recorded immediately in the data collection sheet by the researchers

### **Statistical analysis:**

Before the analysis, the data was cleaned using different data cleaning methods. the participants who had missing answers to questions were excluded from the analysis. Statistical significance was established at a  $p$ -value  $< 0.05$ . SPSS version 22.0 was used to analyze the data (SPSS Inc., Chicago, IL, USA). Descriptive statistical analysis were calculated for the participants' demographic characteristics, vaccination intention, vaccine characteristics influencing, COVID-19 vaccine acceptance and desirable vaccine characteristics influencing the choice of vaccines and factors affecting intentions. The difference between mothers who strongly intend to vaccinate their children in the future and with weaker responses was assessed using a univariate analysis chi-square.

### **Results**

**Table 1** describes the socio-demographic characteristics of the study participants. It was found that the age of more than half (51%) of the participants was between 30-39 years old and nearly half of the

participants (48.3%) were university graduates. The table also revealed that most of the participants (84.1%) were married and nearly three quarter (71.5%) of them was working. Nearly half of participants (44.1%) were mothers of 2 children.

**Figure 1** illustrates that more than quarter (27%) and nearly half (49%) of the participants indicated that they were unlikely and extremely unlikely to get their children vaccinated against COVID-19 respectively. Only 15% and 9% of the mothers indicated that they were likely and extremely likely to vaccinate their children respectively.

**Figure 2** shows factors affecting mothers' vaccination intentions. It was found that, nearly two thirds of the mothers (64%) were hesitant to give their children the vaccine because they are afraid from the side effect of the vaccine on their children, lack of information about the vaccine was a concern for 15% of the participants and lack of trust about the information given about the vaccine was a concern for 9.4% of the participants.

**Table 2**, indicates relation between participants' COVID-19 vaccination intention and their socio-demographic characteristics. It was found that, more than three quarters of the mothers (76%) who participated in the present study were extremely unlikely/ unlikely to vaccinate their children below the age of 18 years, compared to only 24% of the mothers who were extremely likely/ likely to vaccinate their children against COVID19. With regards to the participants' age group, a higher proportion of participants who extremely unlikely/unlikely to vaccinate their children were in the age group category of 30-39 years old (55.1 %,  $P=0.03$ ), university graduate (52.7%,  $P$

$=.002$ ), married (92.5%), working (82.6,  $P=0.001$ ) compared to the participants who were extremely likely/likely vaccinate their children.

**Table 3** illustrates mothers' past vaccination behaviors and vaccine characteristics affecting their vaccination Intention. The results indicated that, among the overall study participants, 72.1% reported that they received COVID-19 dose and 81.6% mentioned that their children received all routine Egyptian government recommended vaccines. In addition, finding on participants opinion toward vaccine characteristics shows that slightly more than half of the participants (54.5%) were willing to give their children COVID-19 vaccine if it's one dose only. A total of 65.4% reported that they would accept a COVID-19 vaccine that has more than 90% effectiveness and 72.1% would accept a COVID-19 vaccine that has minor side effects. More than half of the participants (54.5%) mentioned that they would give the COVID-19 vaccine if the duration of protection of no less than 12 months.

Additionally, the results show that most participants are unaware of the use of mRNA technology in the production of vaccines (63.7%). In addition, more than half of participants (56.1%) said they would only accept COVID-19 vaccine from a particular country of origin. Participants were asked about the first and the second factors they might consider when they decide to give COVID1-9 vaccination to their children under age 18, they reported that the side effect of the vaccine was the first factor ((27.2%) followed by the effectiveness threshold (23.7%) was the second factor.

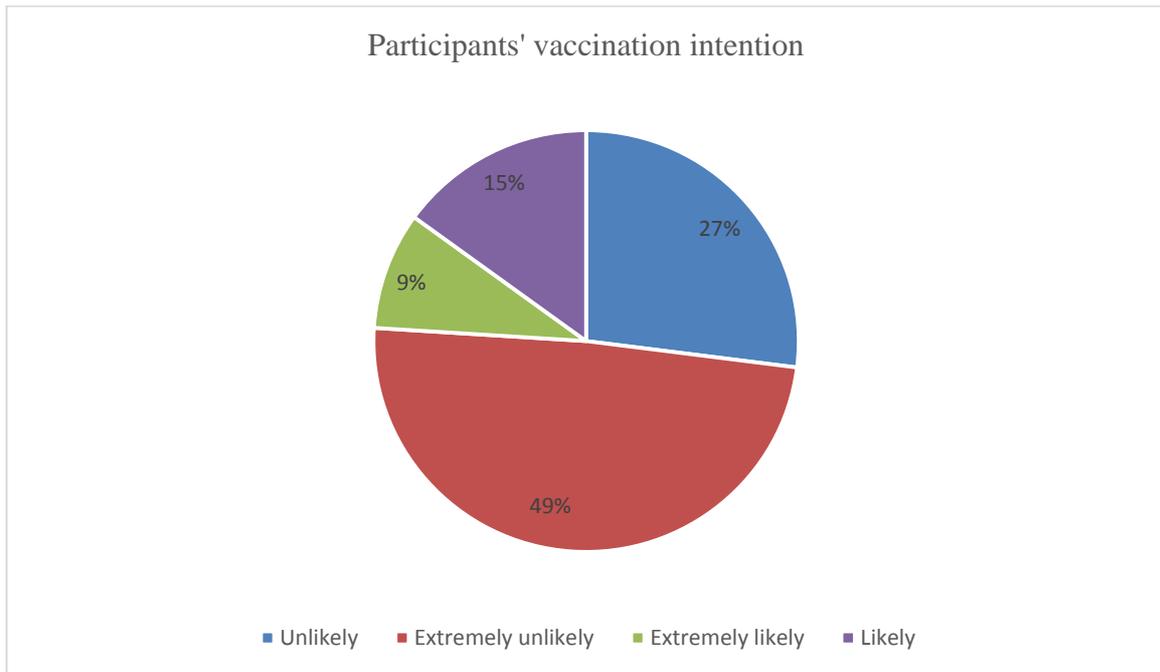
**Figure 3** shows mothers' trust of recommended COVID-19 vaccine dosing

schedule. It was revealed that nearly two thirds of them (60.0%) were scored 5 and more which indicated that they trusted the recommended Covid-19 vaccination schedule. while more than one third of them (40%) were scored less than 5 in this

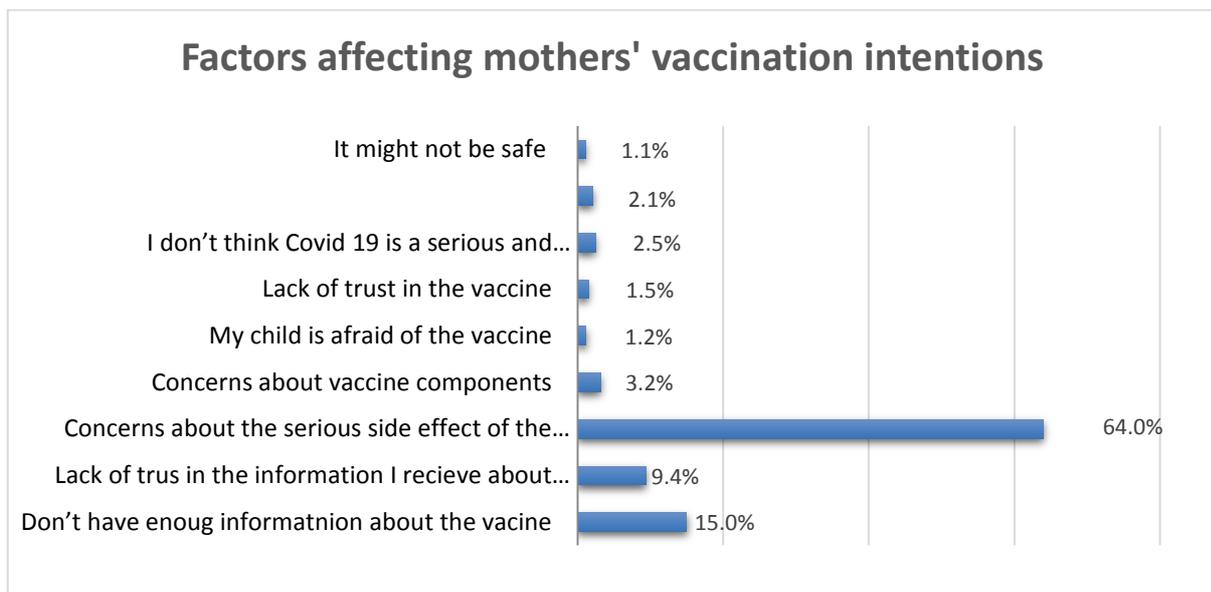
scale which indicated that they didn't trust the recommended COVID-19 vaccination schedule.

**Table 1: Socio-demographic characteristics of the study participants**

Socio-demographic Characteristics of the studied mothers	Study participants (n=1200)	
	No	%
<b>Age (years)</b>		
18-29	223	18.5
30-39	612	51.0
40-49	221	18.4
50-59	124	10.3
60 and above	20	0.08
<b>Educational level</b>		
Illiterate	36	3.0
Primary school	181	15.08
Middle school	43	3.5
High school	330	27.5
University	580	48.3
Postgraduate	30	2.5
<b>Marital status</b>		
Married	1010	84.1
Divorced	160	13.3
Widowed	30	2.5
<b>Employment status</b>		
Working	858	71.5
Not working	342	28.5
<b>Number of children in family</b>		
1	90	7.5
2	530	44.1
3	326	27.1
4 or more	254	21.3



**Figure 1: Mothers' COVID-19 Vaccination intention**



**Figure 2: Factors affecting mothers' vaccination intentions**

**Table 2: Relation between participants' COVID-19 vaccination intention and their socio-demographic characteristics**

Socio-demographic characteristics of the participants	Total sample size (n=1200)		Participants' COVID-19 vaccination intention				P value
			Extremely unlikely/Unlikely (n=912)		Extremely likely/ likely (n=288)		
	NO	%	NO	%	NO	%	
<b>Age (years)</b>							
18-29	223	18.6	160	17.5	63	21.9	0.03*
30-39	612	51.0	503	55.1	109	37.8	
40-49	221	18.4	165	18.1	56	19.4	
50-59	124	10.3	69	7.6	55	19.1	
60 and above	20	1.7	15	1.7	5	1.8	
<b>Educational level</b>							
Illiterate	36	3.0	21	2.3	15	5.3	0.002*
Primary school	181	15.0	119	13.1	62	21.5	
Middle school	43	3.5	36	3.9	7	2.5	
High school	330	27.5	236	25.9	94	32.6	
University	580	48.3	481	52.7	99	34.3	
Postgraduate	30	2.5	19	2.1	11	3.8	
<b>Marital status</b>							
Married	1010	84.2	843	92.5	167	57.9	0.001*
Divorced	160	13.3	54	5.9	106	36.8	
Widowed	30	2.5	15	1.6	15	5.3	

**Table (2): Cont.**

<b>Employment status</b>							
Working	858	71.5	754	82.6	104	36.1	
Not working	342	28.5	260	28.5	82	28.4	0.001*
<b>Number of children in family</b>							
1	90	7.5	60	6.6	30	10.4	
2	420	35.0	398	43.6	22	7.6	0.002*
3	254	21.7	230	25.3	24	8.4	
4 or more	436	36.3	224	24.5	212	73.6	

\*Statistically significant difference at (P<0.05)

**Table 3: Mothers' Past vaccination Behaviors and vaccine characteristics**

Mothers' Past vaccination Behaviors and vaccine characteristics	Total sample (n=1200)		Extremely unlikely/ Unlikely (n= 912)		Extremely likely/ likely (n=288)		P value
	No	%	No	%	No	%	
<b>Did you receive COVID-19 vaccine</b>							
Yes	865	72.1	712	78.1	153	53.2	0.001*
No	335	27.9	200	21.9	135	46.8	
<b>Child up to date in vaccination</b>							0.001*
Yes	980	81.6	809	88.8	171	59.4	
No	220	18.4	103	11.2	117	40.6	
<b>The required COVID-19 vaccination doses</b>							0.002*
Single vaccine	654	54.5	394	43.2	260	90.3	
Booster dose	546	45.5	518	56.7	28	9.7	
<b>Effectiveness threshold of COVID-19 vaccine</b>							
Nearly 90% effective or above	784	65.4	514	56.3	270	93.7	0.001*
Below 90% effective	416	34.6	398	43.7	18	6.3	
<b>Side effects of the COVID-19</b>							

<b>vaccine</b>	865	72.1	589	64.5	276	95.9	0.03*
Minor side effects	335	27.9	323	35.5	12	4.1	
Moderate side effects							
<b>Duration of COVID-19 vaccine protection</b>							
No shorter than 12 months	654	54.5	540	59.2	114	39.5	
Between 6 and 12 months	546	45.5	372	40.8	174	60.5	0.001*

**Table (3): Cont.**

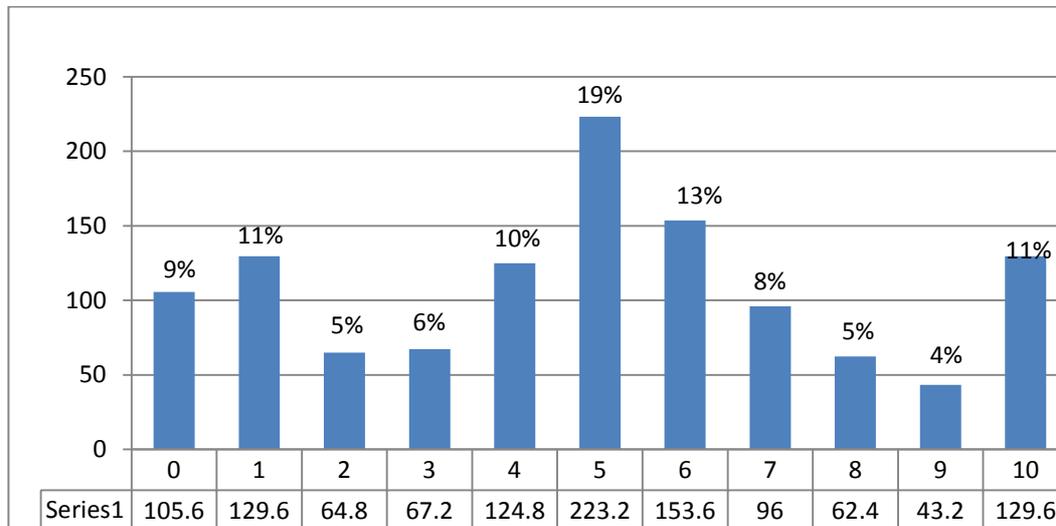
<b>Technology that used in manufacturing COVID-19 vaccine</b>							
With mRNA	185	15.5	132	14.4	53	18.4	0.03*
Without mRNA	250	20.8	77	8.4	173	60.1	
Don't know much about mRNA	765	63.7	703	77.2	62	21.5	
<b>Producing country of the vaccine</b>							
Specific countries	674	56.1	523	57.4	151	52.4	0.01*
Not my concern	526	43.9	389	42.6	137	47.6	
<b>FIRST foremost important factor</b>							
Number of doses	162	13.5	98	10.7	64	22.2	0.02*
Effectiveness threshold	285	23.7	227	24.8	58	20.1	
Side effects	326	27.2	320	35.1	6	2.1	
Duration of protection	212	17.7	160	17.5	52	18.1	
mRNA technology	34	2.8	21	2.4	13	4.5	
Producing countries	12	10.2	54	5.9	68	23.6	
Total cost of vaccination (including booster if required)	59	4.9	32	3.6	27	9.4	

**Table (3): Cont.**

<b>Second foremost important factor</b>							
Number of doses	164	13.6	98	0.8	66	22.9	
Effectiveness threshold	310	25.8	290	31.7	20	6.9	
Side effects	251	20.9	170	18.6	81	28.1	
Duration of protection	198	16.5	130	14.3	68	23.6	0.001*
mRNA technology	68	5.6	54	5.9	14	4.8	
Producing countries	164	13.6	137	15.1	27	9.4	
Total cost of vaccination (including booster if required)	45	3.75	33	3.6	12	4.3	

mRNA stands for messenger RNA which is a molecule used to produce an immune response.

\*Statistically significant difference at (P<0.05)



**Figure 3: Mothers' trust of recommended COVID-19 vaccine dosing schedule**

## Discussion

Covid -19 spreads globally and made individuals' lives in danger, vaccination become a highly important measure to prevent the spread of this disease among adults and children. Expanding immunization coverage to children is a crucial strategy for reducing the burden of the pandemic. Parents are now given the choice of vaccinating their children to protect them from Covid-19 infection and its possible complications.<sup>(12)</sup> There is a gap exists in our comprehension of the Egyptian parent's intention to vaccinate their children and the reasons behind their intentions. Since the mother is the driving force for most of the decisions related to the children, understanding mothers' intentions to administer COVID-19 vaccine to their children is crucial for the development of public health programs to increase the vaccination rate.

The present research showed that, more than quarter and nearly half of the participants were unlikely and extremely unlikely to get their children vaccinated against COVID-19 respectively. This finding was in line with **Szilagyi et al. (2021)**<sup>(17)</sup> who reported a high rate of COVID-19 parental hesitancy. A wide range of parental intentions rates for the COVID-19 immunization for children have been given in some researches. In Saudi Arabia, around 60% of the parents who participated in the study were hesitant to vaccinate their 5-11 years old children and 40% of parents in Turkey were hesitant while above 80% in England and New Zealand are willing to vaccinate their children.<sup>(18-20)</sup> Because of this wide range of vaccine intentions, it is important to understand the factors that lead to these intentions in the Egyptian population.

The hesitant mothers in this study were concerned about the vaccine's side effects and this was the first factor the mothers consider when deciding to vaccinate their children. They will only accept the vaccine that has minor side effects. This hesitancy might be related to the novelty of the vaccine and diverse information about the vaccine in the mass media such as television, newspapers, and social media. Several researchers reported the same findings **Ruggiero et al. (2021)**<sup>(11)</sup>; **Wong et al. (2021)**.<sup>(15)</sup>

The intention of the participants to vaccinate their children against COVID-19 was highly correlated with certain sociodemographic characteristics. More than half of the mothers who were extremely unlikely/unlikely to vaccinate their children were in the age group category of 30-39 years. These results may be due to the mothers in this age group had school-age children or adolescents and they were afraid that the COVID-19 vaccine might affect their children's puberty or fertility. This result is in alignment with several other studies **Almalki et al. (2022)**; <sup>(20)</sup> **Goldman et al. (2020)**<sup>(21)</sup>; **Al Naam et al. (2022)**<sup>(22)</sup>; **Galanis et al. (2022)**<sup>(23)</sup>.

The present study found that more than half of mothers who were extremely unlikely/unlikely to vaccinate their children were university graduates. This result may be due to the novelty of the vaccine administration and lack of knowledge about the effectiveness of the vaccine. Also, most highly educated parents to base their decisions on critical thinking (Schwarzinger, et al., 2021). This is supported by a study conducted by **Al Naam et al. (2022)**<sup>(22)</sup> and **Almalki et al. (2022)**<sup>(20)</sup> revealed in their research that

parents with high educational levels were more hesitant to vaccinate their children against COVID-19. This finding also contradicts results from other studies linking a low level of parental education with greater hesitancy to vaccinate older children; **Bagateli et al. (2021)**.<sup>(24)</sup>

Mothers' COVID-19 vaccination status was a factor associated with their vaccination intention. Mothers who received COVID-19 vaccine were more hesitant to vaccinate their children than mothers who didn't receive the vaccine. This result may be due to a side effect that happened to the mothers after they received the vaccine. Other studies reported the opposite result. **Gendler and Ofri, (2021)**<sup>(25)</sup> reported that the participants' COVID-19 vaccination status was the only socio-demographic factor significantly associated with COVID-19 vaccination acceptability. Lack of information about the vaccine and lack of trust in the recommended doses were important factors mentioned by the mothers. Data from several studies were consistent with the finding of this study and reported that hesitancy about COVID-19 vaccination was associated with the need for more information and lack of trust; **Fisher et al. (2020)**<sup>(26)</sup>; **Fridman et al. (2021)**.<sup>(27)</sup>

### Limitations

This research study used a cross-sectional design, so the causation between the variables can't be fully indicated. Despite these limitations, this study is considered one of the first studies assessing mothers' acceptance and factors affecting their acceptance in Egypt.

### Conclusion

The hesitant mothers in this study were concerned about the vaccine's side effects and this was the first factor the mothers considered when deciding to vaccinate their

children. They will only accept the vaccine that has minor side effects .

### Recommendations

1- Government efforts must be continued to increase mothers' awareness regarding vaccinating their children against Covid 19.

2- Pediatric nurses should understand factors that prevent the mothers from vaccinating their children to be able to design and apply health education campaigns about the COVID-19 vaccine that target mothers, especially in the age group 30-39 and highly educated mothers.

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