

Barriers Analysis of not Receiving COVID-19 Vaccine among a Sample of People Attending AL-Yarmouk Teaching Hospital According to Their Knowledge and Attitude Toward COVID-19 Vaccine

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Abstract:

Background: In November 2021, the Iraqi Ministry of Health announced the opening of more vaccination channels across the country and that those over 12 years of age were to be vaccinated. Vaccination rates are increasing in Iraq but there is very high resistance from a large segment of the population due to misinformation spread among peoples, a lack of knowledge on vaccines and access to the vaccination process from registering to receiving.

Objectives: To assess the knowledge and attitude among a sample of people attending AL Yarmouk teaching hospital toward COVID-19 vaccination.

Subjects and Methods: A cross sectional study was conducted in Baghdad, from beginning of February 2022 to the end of March 2022. Data of 298 participants who attending the out clinic of internal medicine department at AL Yarmouk Teaching Hospital was collected by direct interview using a self- structured questionnaire. The study was approved by the ethics Committee of the Iraqi board for medical specialization. Data were submitted to SPSS version 26 and presented in numbers, tables, and graphs. Chi-square test to show the association was used. P-value of less than 0.05 was considered as statistically significant.

Results: There were 170 (57%) participants within age group 18-30 years. Male participants were 112 (37.6%) while female 186 (62.4%). There were 80(26.8%) un-vaccinated and 218 (73.2%) vaccinated participants. Receiving COVID-19 vaccine appeared to be significantly higher among participants within age group 31-40 years, lives in urban area, have higher education, and who got infected with COVID 19 previously (P=0.01, P=0.02, P=0.001, and P=0.001) respectively. Knowledge of participants about COVID-19 vaccine was good among 90 (30.2%), while attitude was good among 45 (15.1%) participants. Good knowledge was significantly higher among participants with higher education and vaccinated participants P=0.006 and P<0.001 respectively. Poor attitude was significantly higher among female gender (P=0.008).

Most common reasons that drive participant to get COVID-19 vaccine were Fear of infection 127 (58.3%), and their duty to the community to participate in the eradication of the pandemic 115 (52.8%). While most common reasons that prevent un-vaccinated participants from getting COVID-19 vaccine were do notbelieve in the efficacy of the vaccine 36 (45.0%).

Conclusions: Low proportion of participants has good Knowledge 30.2% about COVID-19 vaccine, and very low proportion of participants have good attitude 15.1% about COVID-19 vaccine. Good knowledge was appeared to be dominant among participants with higher education and vaccinated participants. Female gender was a determinant of poor attitude.

Keywords: Barriers to COVID-19 Vaccine, Knowledge toward COVID-19 Vaccine, Attitude

Introduction:

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the cause of the pandemic upper respiratory infection coronavirus disease 2019 (COVID-19). Due to the SARS-CoV-2's highly contagious and harsh pathological outcome, the COVID-19 infection has imposed a massive burden globally, not only for public health, but also economically. ^[1]

Iraqi government announced first COVID-19 case on 24 February 2020. The patient was an Iranian student who has been studying in the Najaf governorate and had entered the country before the implementation of Curfew and banning Iranian nationals from entering Iraq. Then two days later, a family of four members from Kirkuk governorate was diagnosed with COVID 19 the family had just returned from Iran. The Sulaymaniyah governorate reported on 3 March 2020 the death of a 69-year-old COVID-19 patient. ^[2]

Most countries around the world taken many measures to reduce the transmissibility from coronavirus

disease 2019 (COVID-19) as well as the rates of hospitalization and death. These measures have included maintaining social distancing, enforcing face masks policy, washing hands, using sanitizers, travel restrictions and, in many countries, imposing curfews ^[3].

On December 11, 2020, the U.S. Food and Drug Administration released the first emergency use authorization (EUA) for a vaccine for the prevention of COVID-19 in individuals 16 years of age and older ^[4]. The EUA allowed the Pfizer-BioNTech COVID-19 vaccine to be distributed in the U.S as the first vaccine in the worlds ^[5]. In November 2021, in order to increase vaccination coverage. The Iraqi Ministry of Health announced the opening of more vaccination channels across the country and that those over 12 years of age were to be vaccinated ^[6]. Priority for COVID 19 vaccinationis given to protecting those most at risk of contracting the disease, including health workers, those over the age of 60, and all people with chronic diseases or immunosuppression. The most frequently reported local reaction to COVID 19

vaccine was pain and tenderness at the injection site among vaccine recipients, including adolescents; redness and swelling were reported less frequently. Fatigue, malaise, headache, and muscle pain were the most commonly reported systemic reactions. Most symptoms were resolved within 1–3 days. A rare risk for myocarditis and pericarditis has been observed following receipt of mRNA COVID-19 vaccines (i.e., Moderna or Pfizer-BioNTech) and Novavax COVID-19 Vaccine.^[6]

Vaccine hesitancy was defined by the WHO Strategic Advisory Group of Experts (SAGE) as delay in acceptance or refusal of vaccination despite availability of vaccination outlets. Low uptake of vaccines is determined to be a major threat to the impact of vaccination in the prevention morbidity and mortality from the disease.^[7] Vaccine acceptability is determined by three factors: confidence, convenience, and complacency^[8]. Confidence is defined as the trust in the safety and effectiveness of the vaccine, trust in the delivery system as the healthcare system, and the trust in the policymakers.^[9] Complacency exists where perceived risks of vaccine-preventable diseases are low and vaccination is not believed a necessary preventive action. Convenience is a significant factor when afford ability and willingness-to-pay, availability, geographical accessibility, ability to understand and resumption of immunization services affect uptake. The degree and the quality of the service to which vaccination services are delivered at a time and place and in a cultural situation that is convenient and comfortable also affect the decision to be vaccinated and could lead to vaccine hesitancy.^[7]

Vaccine hesitancy is considered to be a multi-factored phenomenon affected by many factors. This includes cognitive, psychological, socio-demographic, political and cultural factors that contribute to it and differ across different community.^[10] Fournet et al. have identified four unprotected and under protected population groups that could form the basis for the development of a locally developed strategy:

1. The hesitant’–Those who have concerns about perceived safety matter and are unsure about needs, procedures and timings for immunizing.
2. The unconcerned’–Those who consider immunization a low priority and see no real perceived risk of vaccine-preventable diseases.
3. The poorly reached’–Those who have difficult access to services, related to poverty, social exclusion and, in the case of more integrated and affluent populations, factors related to convenience.

The active resisters’–Those for whom personal, cultural, or religious beliefs discourage them from vaccinating^[9]. Fading public confidence in vaccines due to rumors and conspiracy theories is a major challenge for public health experts and policymakers’ worldwide. Hesitation, spreading rumors, and fake news can affect public mentality and vaccine decisions^[11]. One of the top ten threats for global health has been identified was the Vaccine hesitancy^[12]. Lots of studies have demonstrated that when a new vaccination is released, a

variety of factors contribute to vaccine social acceptance. These concerns include the new vaccine safety and effectiveness, negative health impacts, misunderstandings about the importance of vaccination, a lack of trust in the health system, and a lack of community knowledge about vaccine-preventable illnesses. Vaccination rates are increasing in Iraq but there is very high resistance from a large segment of the population due to misinformation spread among peoples, a lack of knowledge on vaccines and access to the vaccination process from registering to receiving. This is very obvious in those marginalized segments of the community refugees, women, and those from low socio- economic status. As vaccination efforts continue, it is critical to increase people’s confidence in the COVID-19 vaccines to fight the COVID-19 pandemic^[13]. A worldwide survey shown that among the 6639 respondents, 22.5% were hesitant on Covid-19 vaccine of which 50.37% mentioned about side effect, as a major determinant of their vaccination decisions^[14]. A cross-sectional study on 45,928 peoples in Low- and Middle-Income Countries (LMICs) of Asia, Africa, and South American countries showed that COVID-19 vaccine hesitancy was 20% and 40%, respectively. The author also indicated that side effects and effectiveness were the potential factors for a people considered to be vaccinated^[15]. The Middle East has some of the lowest COVID-19 vaccination adoption rates in the world. Kuwait (23.6%) had the lowest acceptance rate, followed by Jordan (36.8%), Saudi Arabia (64.7%), and Turkey (66.0%)^[16]. The importance of this study to measure the level of willingness in the community to receive Covid-19 vaccine. The Iraqi community’s willingness to take the COVID-19 vaccine can be enhanced by utilizing social media and community influencers to spread awareness about the vaccine’s safety and efficacy. Examine the causes of COVID-19 vaccine hesitancy to identify potential strategies to boost COVID-19 vaccine acceptance.

Aims of the study:

- 1- This study aimed to assess the knowledge among a sample of people attending AL Yarmouk teaching hospital toward COVID-19 vaccination.
- 2- Assess the attitude among a sample of people attending AL-Yarmouk teaching toward covid 19 vaccination.

Subject and Methods

A cross-sectional study was carried out at AL -Yarmouk Teaching Hospital that located at AL-Karkh side in Baghdad-Iraq. The data were collected from the begging of February 2022 to the end of March 2022.

The target population was represented by people attending the out clinic of internal medicine department at AL Yarmouk Teaching Hospital. All adults aged 18 years and above attending the out clinic of internal medicine department were include in this study. A convenience sampling was carried out to include 298 participants who attending the out clinic of internal medicine department at AL Yarmouk Teaching Hospital.

Data were collected using a structured self-administering questionnaire three days per week, and five hours per day for

two consecutive months. The questionnaire was prepared by author and revised by supervisor through reviewing previous related studies. (17, 18)

The questionnaire was composed of four parts:

1. Part one: It included sociodemographic data, three questions about history of ~~in~~ with COVID -19 and one question about status of COVID -19 vaccination.

2. Part two: It included twelve questions about knowledge toward COVID -19 vaccine and question about source of information of COVID -19 vaccine.

3. Part three: It included three questions about attitude toward COVID -19 vaccine.

4. Part four: It included two sections:

A-Section one: It included six questions to determine the causes that drive the participant to get COVID -19 vaccine.

B-Section two: It included nine questions to determine the causes of not taking COVID -19 vaccine.

Ethical Consideration:

The study was approved by the ethics Committee of the Iraqi board for medical specialization and by Al- Karkh health directorate, Ministry of Health. The participants filled the questionnaire by themselves and they have had the option to return an empty or filled out survey. Informed consent was inferred by each participant's return of a completed survey; also their confidentiality was protected

Statistical analysis:

Microsoft Excel 2016 and IBM SPSS-version 26 (Statistical Packages for Social Sciences -version 26) were used for data entry, management, and analysis. Descriptive statistic was used in form of frequencies and percentages for categorical data. While mean of standard deviation was used for quantitative data that is normally distributed, represented by figures and tables.

The significance of association of different percentages (qualitative data) was testing using chi-square test or fisher's exact test. Statistical significance was considered whenever the P value was equal or less than 0.05.

Scoring:

All questions having two possible answers were given

either 1 point for correct response or zero points for wrong or uncertain response. Total score of 50% or less considered as poor, total score of 51-75% considered as average, while total score of >75% considered as good.

Results:

Socio-demographic characteristics and disease history of participants:

A total of 298 participants were included in this study. There were 170 (57%) participants within age group 18-30 years. Male participants were 112 (37.6%) while female 186 (62.4%). Residence of participants was urban among 281(94.3%). Marital status of participants was single among 112 (37.6%), married among 178 (59.7%), and divorced/widow among 8(2.7%). Occupation of participant was governmental employee among 158 (53.0%). Most common education was secondary school among 174 (58.4%) (Table 1).

Out of the total participants, there were 80 (26.8%) unvaccinated and 218 (73.2%) vaccinated participants. There were 205 (68.8%) participants got infected with COVID-19, 156 (52.3%) have relatives infected with COVID-19 and admitted to RCU, and 146 (49.0%) have relatives died from COVID-19 (Table 2).

Socio-demographic features of participants were elucidated in table 3 according to their vaccination status. Receiving COVID-19 vaccine appeared to be significantly higher among participants within age group 31-40 years, lives in urban area, and have higher level of education ($P=0.01$, $P=0.02$, and $P=0.001$) respectively.

Disease history of participants was elucidated in table 4 according to their vaccination status, receiving COVID-19 vaccine appeared to be significantly higher among participants who got infected with COVID 19 previously ($P=0.001$). It is observed that vaccination rate among participants that didn't have any relatives infected with COVID-19 and admitted to RCU was closed to those who had relatives infected with COVID-19 and admitted to RCU and with no significant difference. ($P=1$). The vaccination rate among participants that had any relatives died from COVID-19 was slightly higher than those who didn't have, but with no significant difference. ($P=0.5$) (Table 4).

Table 1: Distribution of the participants (n=298) according to Socio-demographic features at AL -Yarmouk Teaching Hospital 2022

		N	%
Age Group/ years	18-30	170	57.0%
	31-40	74	24.8%
	41-50	28	9.4%
	>50	26	8.7%
Gender	Male	112	37.6%
	Female	186	62.4%
Residence	Urban	281	94.3%
	Rural	17	5.7%
Marital status	Single	112	37.6%
	Married	178	59.7%
	Divorced/Widow	8	2.7%
Occupation	Governmental employee	158	53.0%
	Self-employee	105	35.2%
	Student	35	11.7%
Educational level	Illiterate	7	2.3%
	Primary	48	16.1%
	Secondary	174	58.4%
	Bachelor	40	13.4%
	Higher education	29	9.7%
	Total	298	100.0%

Table 2: Distribution of the participants (n=298) according to Disease history of participants, at AL -Yarmouk Teaching Hospital 2022

		N	%
Did you get infected with COVID-19 previously?	No	93	31.2%
	Yes	205	68.8%
Did you have any relatives infected with COVID-19 admitted toRCU?	No	142	47.7%
	Yes	156	52.3%
Did you have any relatives died from COVID-19?	No	152	51.0%
	Yes	146	49.0%
Total		298	100.0%

Table 3: Socio-demographic features of participants according to their vaccination status, (n=298).

Socio-demographic features		Vaccination status				Total		P value
		Un-vaccinated		Vaccinated				
		N	%	N	%	N	%	
Age group	18-30	48	28.2	122	71.8	170	100.0	0.01*
	31-40	11	14.9	63	85.1	74	100.0	
	41-50	13	46.4	15	53.6	28	100.0	
	>50	8	30.8	18	69.2	26	100.0	
Gender	Male	24	21.4	88	78.6	112	100.0	0.11
	Female	56	30.1	130	69.9	186	100.0	
Residence	Urban	71	25.3	210	74.7	281	100.0	0.02*
	Rural	9	52.9	8	47.1	17	100.0	
Marital status	Single	28	25.0	84	75.0	112	100.0	0.71
	Married	49	27.5	129	72.5	178	100.0	
	Divorced/Widow	3	37.5	5	62.5	8	100.0	
Occupation	Governmental employee	39	24.7	119	75.3	158	100.0	0.49
	Self-employee	29	27.6	76	72.4	105	100.0	
	Student	12	34.3	23	65.7	35	100.0	
Educational level	Illiterate	3	42.9	4	57.1	7	100.0	0.001*
	Primary	23	47.9	25	52.1	48	100.0	
	Secondary	39	22.4	135	77.6	174	100.0	
	Bachelor	12	30.0	28	70.0	40	100.0	
	Higher education	3	10.3	26	89.7	29	100.0	

Table 4: Distribution of the participants (n=298) according to Disease history of participants by their vaccination status, at AL - Yarmouk Teaching Hospital, 2022

Disease history		Vaccination status				Total		P* value
		Un- vaccinated		Vaccinated				
		N	%	N	%	N	%	
Did you get infected with	No	37	39.8	56	60.2	93	100.0	0.001
COVID-19 previously?	Yes	43	21.0	162	79.0	205	100.0	
Did you have any relatives infected with COVID-19 admitted to RCU?	No	38	26.8	104	73.2	142	100.0	1
	Yes	42	26.9	114	73.1	156	100.0	
Did you have any relatives died from COVID-19?	No	38	25.0	114	75.0	152	100.0	0.5
	Yes	42	28.8	104	71.2	146	100.0	

Knowledge Related to COVID-19 Infection and Vaccine

Among knowledge questions that related to COVID-19 Infection and Vaccine, the highest correct answer was for the question (Does COVID-19 vaccine reduce the severity of

infection? 209 (70.1%)) then for (Is COVID-19 vaccine essential for us? 188 (63.1%)). While the lowest correct answer was for the question (Is COVID-19 vaccine is safe? 174 (58.4%)) as shown in table 5.

Table 5: knowledge of participants about COVID-19 Infection and Vaccine,n=298

Questions of knowledge	Correct answer		Incorrect answer		I Don't know	
	N	%	N	%	N	%
1. Is COVID-19 vaccine is safe?	174	58.4%	36	12.1%	88	29.5%
2. Is COVID-19 vaccine essentialfor us?	188	63.1%	41	13.8%	69	23.2%
3. Does COVID-19 vaccine reducesthe severity of infection?	209	70.1%	39	13.1%	50	16.8%

Among knowledge questions that related to the people who are eligible for taking COVID-19 vaccine in Iraq, the highest correct answer was for the question (Infant < 1 year; 278

(93.3%)) then for (Adults>18 years; 228 (76.5%)). While the lowest correct answer was for the question (Persons having active COVID-19 infection; 45 (15.1%)) as shown in table 6.

Table 6: knowledge of participants about the people who are eligible fortaking COVID-19 vaccine in Iraq, n=298.

Questions of knowledge	Correct answer		Incorrect answer		I Don't know	
	N	%	N	%	N	%
Infant < 1year	278	93.3	14	4.7	6	2.0
Children and adolescents<18 years old.	81	27.2	207	69.5	10	3.4
Adults>18 years.	228	76.5	56	18.8	14	4.7
Pregnant ladies and lactating mothers.	88	29.5	202	67.8	8	2.7
Patients with chronic diseases like diabetes, hypertension and heart diseases.	147	49.3	129	43.3	22	7.4
Persons having active COVID-19 infection.	45	15.1	246	82.6	7	2.3
Persons recovered from COVID-19infection.	115	38.6	175	58.7	8	2.7
Persons allergic to food Items/drugs.	219	73.5	63	21.1	16	5.4

According to the source of information about COVID-19 vaccine among all participants; social media (Facebook, instagram and whatsApp) was the mostcommon source of information; 182 (61.1%) then the news from national TV /

Radio 125 (41.9%), and least source was the health care provider 80 (26.8%); with no significant difference regarding vaccination status; $P>0.05$ (Table 7).

Table 7: Source of information about COVID-19 vaccine according to vaccination status of the participants, n=298.

Source of information	Vaccination status				Total		p* value
	Un- vaccinated		Vaccinated				
	N	%	N	%	N	%	
News from national TV / Radio	32	25.6%	93	74.4%	125	41.9%	0.69
Social media (Facebook, instagram and whatsApp)	51	28.0%	131	72.0%	182	61.1%	0.59
Friends and family	30	31.3%	66	68.8%	96	32.2%	0.26
Health care provider	23	28.8%	57	71.3%	80	26.8%	0.66

Knowledge of participants about COVID-19 vaccine was poor among 39 (13.1%) participants, average among 169

(56.7%) participants, and good among 90 (30.2%) participants, as shown in figure 2.

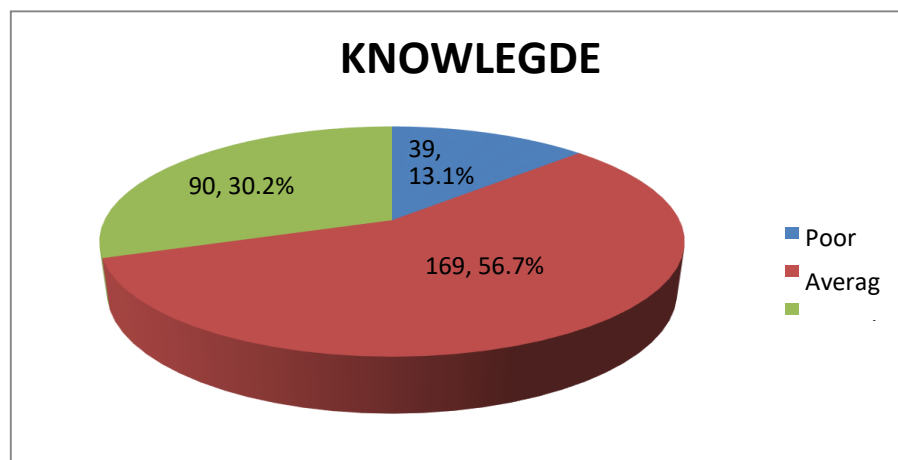


Figure 1: Knowledge of participants about COVID-19 vaccine, n=298

No significant difference was found between socio-demographic features of participants and their Knowledge about COVID-19 vaccine; $P>0.05$; except that for educational level, where good knowledge was significantly higher among

participants with higher education, $P=0.006$, (Table 8). Good knowledge about COVID-19 vaccine was significantly higher among vaccinated participants, $P<0.001$.

Table 8: Distribution of socio-demographic features of participants regarding their Knowledge about COVID-19 vaccine, n=298

Socio-demographic features		Knowledge about COVID-19 vaccine						P* value
		Poor knowledge		Average knowledge		Good knowledge		
		N	%	N	%	N	%	
Age group/Years	18-30	20	11.8	95	55.9	55	32.4	0.94
	31-40	12	16.2	42	56.8	20	27.0	
	41-50	4	14.3	17	60.7	7	25.0	
	>50	3	11.5	15	57.7	8	30.8	
Gender	Male	14	12.5	62	55.4	36	32.1	0.84
	Female	25	13.4	107	57.5	54	29.0	
Residence	Urban	35	12.5	160	56.9	86	30.6	0.4
	Rural	4	23.5	9	52.9	4	23.5	
Marital status	Single	10	8.9	64	57.1	38	33.9	0.14
	Married	29	16.3	98	55.1	51	28.7	
	Divorced/Widow	0	0.0%	7	87.5	1	12.5	
Occupation	Governmental employee	25	15.8	89	56.3	44	27.8	0.48
	Self-employee	12	11.4	60	57.1	33	31.4	
	Student	2	5.7	20	57.1	13	37.1	
Educationallevel	Illiterate	0	0.0	5	71.4	2	28.6	0.006
	Primary	6	12.5	19	39.6	23	47.9	
	Secondary	24	13.8	64	36.8	86	49.4	
	Bachelor	8	20.0	19	47.5	13	32.5	
	Higher education	1	3.4	4	13.8	24	82.8	

Attitude toward COVID-19 Infection and Vaccine

Among attitude questions that related to COVID-19 infection and vaccine, it is observed that 218 (73.2%) of participants agreed with statement (I will recommend my family and friends to get vaccinated against COVID-19). 213(71.5%) of participants disagreed with statement (I will prefer to

acquire immunity against COVID-19 naturally (by having the disease/subclinical infection) rather than by vaccination. 153(51.3%) of the participants agreed with statement (I am willing to get the COVID-19 vaccine, even if I have to pay to get the vaccine (Table 9).

Table 9: Attitude of participants toward COVID-19 Infection and Vaccine,(n=298)

Questions of Attitude	Agree		Disagree		Not Sure	
	N	%	N	%	N	%
1. I will prefer to acquire immunity against COVID-19 naturally (by having the disease/subclinical infection) rather than by vaccination.	75	25.2	213	71.5	10	3.4
2. I am willing to get the COVID-19 vaccine, even if I have to pay to get the vaccine.	153	51.3	135	45.3	10	3.4
3. I will recommend my family and friends to get vaccinated against COVID-19.	218	73.2	69	23.2	11	3.7

Attitude of participants toward COVID-19 vaccine was poor among 143 (48.0%) participants, average

among 110 (36.9%) participants, and good among 45 (15.1%) figure 2.

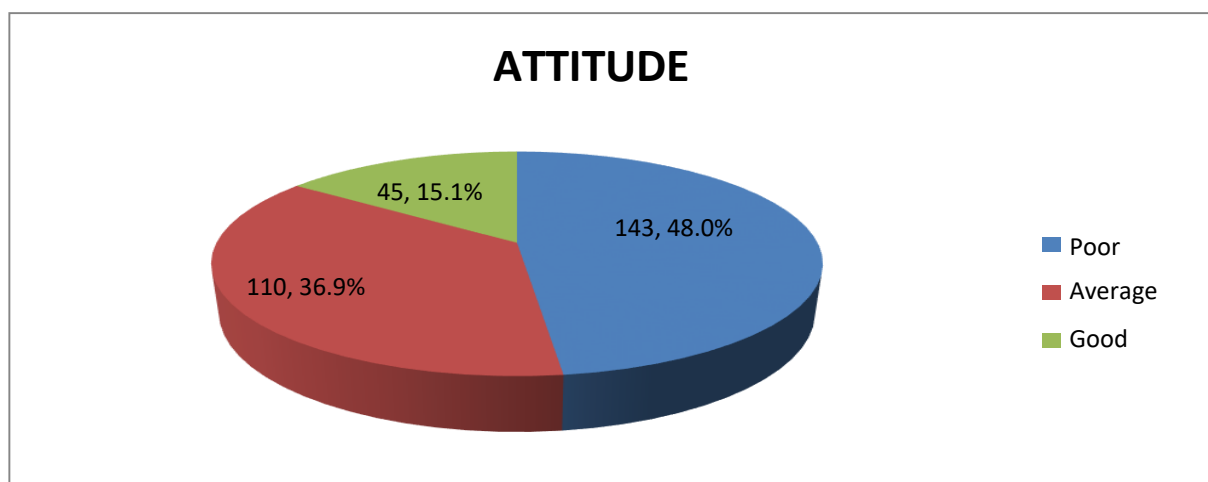


Figure 2: Attitude of participants toward COVID-19 vaccine, n=298

Attitude was significantly higher among female gender ($P=0.008$) as shown in Table 10
Vaccination was significantly higher among

participants with average attitude toward COVID-19 vaccine, $P<0.001$

Table 10: Distribution of socio-demographic features of participants regarding their Attitude about COVID-19 vaccine, n=298

Socio-demographic features		Attitude toward COVID-19 vaccine						P* value
		Poor attitude		Average attitude		Good attitude		
		N	%	N	%	N	%	
Age group	18-30	78	45.9	67	39.4	25	14.7	0.43
	31-40	35	47.3	30	40.5	9	12.2	
	41-50	17	60.7	6	21.4	5	17.9	
	>50	13	50.0	7	26.9	6	23.1	
Gender	Male	51	45.5	35	31.3	26	23.2	0.008
	Female	92	49.5	75	40.3	19	10.2	
Residence	Urban	132	47.0	107	38.1	42	14.9	0.23
	Rural	11	64.7	3	17.6	3	17.6	
Marital status	Single	52	46.4	42	37.5	18	16.1	0.88
	Married	87	48.9	66	37.1	25	14.0	
	Divorced/Widow	4	50.0	2	25.0	2	25.0	
Occupation	governmental employee	77	48.7	58	36.7	23	14.6	0.93
	self-employee	48	45.7	39	37.1	18	17.1	
	student	18	51.4	13	37.1	4	11.4	
Educational level	Illiterate	3	42.9%	3	42.9	1	14.3	0.23
	Primary	15	31.3%	22	45.8	11	22.9	
	Secondary	50	28.7%	61	35.1	63	36.2	
	Bachelor	13	32.5%	17	42.5	10	25.0	
	Higher education	5	17.2%	9	31.0	15	51.7	

Causes that drive the participant to taking (or not taking) COVID-19 vaccine

Most common reasons that drives participant to get COVID-19 vaccine were Fear of infection 127 (58.3%), their duty to the community to participate in the eradication of the pandemic 115 (52.8%), and to be able to travel and practice vaccination related activities 48 (22.0%) as shown in table 11.

Most common reasons that prevent un-vaccinated participants from getting COVID-19 vaccine were do not believe in the efficacy of the vaccine 36 (45.0%), do not need the vaccine as I am committed to precautionary measures 22 (27.5%), got infected with COVID-19 previously and do not need to be vaccinated 19 (23.8%), and not comfortable with side effects 17 (21.3%) as shown in table 12

Table 11: Reasons explaining positive attitudes of vaccinated participantstoward COVID-19 vaccination, n=218.

Reasons	N	%
(i) Confidence in the decisions of the government of Iraq.	19	8.7
(ii) Fear of infection.	127	58.3
(iii) The death of a relative after corona infection.	39	17.9
(iv) My duty to the community to participate in the eradication of the pandemic.	115	52.8
(v) To be able to travel and practice vaccination related activities.	48	22.0
(vi) Encouragement from the family.	18	8.3

Table 12: Reasons explaining negative attitudes of un-vaccinated participantstoward COVID-19 vaccination, n=80.

Un-Vaccinated	N	%
(i) Do not believe in the efficacy of the vaccine.	36	45.0
(ii) Do not believe in the need for the vaccine.	14	17.5
(iii) Got infected with COVID-19 previously and do not need to be vaccinated.	19	23.8
(iv) Do not need the vaccine, as I am committed to precautionary measures.	22	27.5
(v) I think there is a conspiracy about the disease and the vaccine.	11	13.8
(vi) Not eligible for vaccination, due to allergy, pregnancy, other.	9	11.3
(vii) Family opposition.	9	11.3
(viii) Not comfortable with side effects.	17	21.3
(ix) Not confident of the adequacy of previous clinical trials to lunch the vaccine.	11	13.8

Discussion:

Regarding the study sample's characteristics, more than half of the participants in the present work were females aged (18-30) years old. This finding was similar to the results obtained in Iraq by Shareef *et al.*, 2022⁽¹⁹⁾ and in China by Zhong *et al.*, 2020⁽²⁰⁾, which revealed that a high proportion of the participants were females aged (18-29) years old. Concerning residency and occupation, 94.3% of all participants lived in an urban area, and 53.0% had been working as a government employee in this study. In contrast, a study in Ethiopia by Negera *et al.*, 2020⁽²¹⁾ stated that 69.7% of participants lived in an urban area, and self-employees constituted 34.9%. Married participants with secondary education constituted more than half of the responders in this study (59.7% and 58.4%), respectively. However, a study in Bangladesh by Islam *et al.*, 2021⁽²²⁾ had a different scenario which found that unmarried participants with higher levels of education constituted about (85.5% and 82.6%), respectively.

In this study, 73.2% of participants were vaccinated, which did not agree with the number of participants who reported being vaccinated in Saudi Arabia by Zahid *et al.*, 2021⁽¹⁷⁾ in which only 36.9% of participants had vaccinated. While a study done in Singapore by Cheng *et al.*, 2022⁽²³⁾ reported that 94.7% of participants had been vaccinated. The vaccination rates could reflect an increase in the general public awareness level in the comparable study, in addition to differences in the time of the data collection among studies.

Sixty-eight percent (68%) of participants got infected with COVID-19 previously in this study. In contrast, a study in Iraq by Shareef *et al.*, 2022⁽¹⁹⁾ mentioned that about 47.0% of the participants had a personal history of COVID-19 infection. It could be due to the differences in the sample selection between the two studies; the comparable study used a short web-based questionnaire.

The current study revealed an excess vaccination rate among participants aged 31-40 years and a high level of education ($P=0.01$ and $P=0.001$), respectively. These findings were inconsistent with the results conducted in Singapore by Cheng *et al.*, 2022⁽²³⁾; the study revealed that vaccination status was not associated significantly with age and educational level. Vaccines' cost, effectiveness, and protection duration are essential factors in receiving the COVID-19 vaccine^(24, 25). It is observed that the vaccination rate was higher among single male participants with a governmental job; but with no significant difference ($P=0.71$, $P=0.11$, and $P=0.49$), respectively. These results were similar to the

findings in Saudi Arabia by Zahid *et al.*, 2021⁽¹⁷⁾ in which there was no statistical significance in vaccination rate among unmarried and government employees, but there was a statistical significance in males participants who vaccinated, $P=0.019$, possibly due to job requirements and other social obligations. Concerning residency, the vaccine appeared to be significantly higher among participants who lived in an urban area ($P=0.02$), which is aligned with a study in Bangladesh by Mistry *et al.*, 2022⁽²⁶⁾, in which not receiving COVID-19 vaccine appeared to be significantly higher among participants who lived in a rural area, this could be because rural residents have limited access to various information sources, particularly on social media⁽²⁷⁾.

The present study observed that vaccinated participants were significantly higher among those infected with COVID-19 previously ($P=0.001$), which shares the same opinion in Iraq by Shareef *et al.*, 2022 ($P=0.001$)⁽¹⁹⁾. It could be due to their willingness to minimize the virus's spread in community due to their past experience with COVID-19 infection.

More than half of this study's participants (58.4%) knew that the COVID-19 vaccine is safe, and 63.1% of them knew that the COVID-19 vaccine is essential for us, which is inconsistent with what was observed in Bangladesh by Mistry *et al.*, 2022⁽²⁶⁾ that stated 25.5% of the participants knew the vaccine would be safe, and 73.9% of them knew that COVID-19 vaccine is essential for us, a considerably these differences might be due to misinformation and rumors about the vaccine. Because the pandemic started in December 2019 and so much was unknown, misinformation evolved alongside facts about the disease, affecting perceptions worldwide.⁽²⁸⁾

Regarding the eligibility for taking the COVID-19 vaccine in Iraq, 93.3% of participants knew that infants less than 1 year are not eligible, then 27.2% and 76.5% of participants, respectively, knew that children and adolescents less than 18 years old, adults more than 18 years are eligible, also (29.5% and 49.3% of participants), respectively thought that pregnant ladies and lactating mothers, patients with chronic diseases like diabetes, hypertension, and heart diseases are eligible, but only 15.1% of participants knew that persons who had active COVID-19 infection are not eligible to vaccinate, 38.6% of participants knew that persons who had recovered from COVID-19 infection are eligible to vaccinate, and 73.5% of them knew that persons allergic to food or drugs are eligible. In India, a study by Kumari *et al.*, 2021⁽²⁸⁾ found results contradict with our findings about the participants who know the

people that are not eligible for taking the COVID-19 vaccine

Regarding the source of information about the COVID-19 vaccine among all participants, the most common source of information was social media (Facebook, Instagram, and WhatsApp), and the minor source was the health care provider. While in Saudi Arabia a study by Zahid *et al.*, 2021⁽¹⁷⁾ had identified that the source of information was the awareness campaign, then friends and family, doctors and health care professionals.

The finding in the current study has shown that the participant's level of COVID-19 knowledge is good among 30.2%, which is lower than the result in Ethiopia by Negera *et al.*, 2020⁽²¹⁾ revealed that about 42% of respondents showed good knowledge. However, other studies observed different levels of knowledge, like in China by Zhong *et al.*, 2020⁽²⁰⁾ and in Saudi Arabia by Al-Hanawi *et al.*, 2020⁽²⁹⁾, which displayed the knowledge as follows: (80.5% and 81.6%), respectively. This level of knowledge about COVID-19 could be due to policy-decision makers generating contextual knowledge platforms to provide easy and accessible ways of getting credible information in a country.

No significant difference was found between the socio-demographic features of participants (age, residence, occupation) and their knowledge about the COVID-19 vaccine; $P>0.05$; while a study in Egypt by Abdelhafiz *et al.*, 2020⁽³⁰⁾ observed that knowledge was significantly lower among older, rural residents, and lower-income participants. This work showed that participants with higher education had significantly good knowledge ($P=0.006$) than those with less education, which is resembled a study in Egypt by Abdelhafiz *et al.*, 2020.⁽³⁰⁾ The higher education level has more information about vaccines and their effect when compared to low-educated participants. This study demonstrates that good knowledge about the COVID-19 vaccine was significantly higher among vaccinated participants ($P<0.001$). This finding was consistent with the results conducted in Singapore by Cheng *et al.*, 2022.⁽²³⁾

Regarding attitude, about 25.2% of participants prefer to acquire immunity against COVID-19 naturally rather than by vaccination, but 51.3% of them were willing to get the COVID-19 vaccine, even if they have to pay to get the vaccine, and 73.2% of participants agreed to recommend their families and friends to get a vaccine against COVID-19, inconsistent to the study in Indian by Kumari *et al.*, 2021.⁽²⁸⁾ The discrepancy could be related to the barriers and facilitators of the COVID-19 vaccine and vaccination program administered across our country and India. No significant difference was found

between the socio-demographic features of participants (age, residence) and their attitude about the COVID-19 vaccine; $P>0.05$; while a study in India by Kumari *et al.*, 2021⁽²⁸⁾ observed that attitude was significantly good among older participants and those residing in urban settings were more willing to take the COVID-19 vaccine $P<0.001$. The willingness to get vaccinated is multifaceted and is influenced mainly by various drivers and barriers. The determinants of the COVID-19 vaccine include its usefulness in eradicating the disease, recommendations by doctors and role models, sufficient data available about the vaccine's safety, and considering it a societal responsibility to get vaccinated⁽²⁸⁾.

In the current work, females showed significant poor attitude ($P=0.008$); this result agreed with a study in Oman by Al-Marshoudi *et al.*, 2021⁽³¹⁾ which reported that males were more willing to be vaccinated than females. Vaccination was significantly higher among participants with average attitude toward COVID-19 vaccine, $P<0.001$, which was coincided with the vast majority of the participants in India by Kumari *et al.*, 2021⁽²⁸⁾ that held a positive optimistic attitude towards the COVID-19 vaccine.

The most common reasons that drove participants to get the COVID-19 vaccine in this study were as follows: explain the fear of infection, their duty to the community to participate in the eradication of the pandemic, to be able to travel and practice vaccination-related activities, the death of a relative after corona infection, confidence in the decisions of the government of Iraq, and encouragement from the family (58.3%, 52.8%, 22.0%, 17.9%, 8.7%, 8.3%), respectively. While in Saudi Arabia (KSA), a study by Zahid *et al.*, 2021⁽¹⁷⁾ in which the highest factor influencing participants positively toward vaccination (54.8%) was that the participants had confidence in the decisions of the government of the KSA, then their duty to the community (48.7%), 31.6% of them was to be able to travel, fear of infection (31.2%), encouragement from the family (19.4%), and the death of a relative (6.60%). It could be due to the risk management plan, the precautionary measures that the KSA followed during the COVID-19 pandemic, and public trust in the government that has been used to enhance the acceptance of COVID-19 vaccination in countries such as gulf countries⁽³²⁾.

The most common reasons that prevented unvaccinated participants from getting the COVID-19 vaccine were as follows: did not believe in the efficacy of the vaccine (45.0%), then about 23.8% of participants got infected with COVID-19 previously and do not need to be vaccinated, 21.3% not comfortable with side effects, 17.5% do not believe

in the need for the vaccine, 13.8% they think there was a conspiracy about the disease and the vaccine, 11.3% think not eligible for vaccination, due to allergy, pregnancy, and due to family opposition, 13.8% of them was related to the not confident of the adequacy of previous clinical trials to launch the vaccine. These findings are different from that study in Saudi Arabia (KSA) by Zahid *et al.*, 2021⁽¹⁷⁾.

Conclusion:

1. Receiving COVID-19 vaccine appeared to be significantly higher among participants within age group 31-40 years, lives in urban area, have higher education, and who got infected with COVID 19 previously.
2. Low proportion of participants has good Knowledge 30.2% about COVID-19 vaccine, and very low proportion of participants have good attitude 15.1% about COVID-19 vaccine.
3. Good knowledge was appeared to be dominant among participants with higher education and vaccinated participants..
4. Most common reasons that drives participant to get COVID-19 vaccine were Fear of infection and their duty to the community to participate in the eradication of the pandemic.
5. Most common reasons that prevent un-vaccinated participants from getting COVID-19 vaccine were do not believe in the efficacy of the vaccine 45.0%.

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