

Compliance of Parents to Complete the Vaccination Schedule for their Children Under Two Years Old During COVID 19 Outbreak in Najaf District, Iraq

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Abstract

Background: The most important method to prevent communicable disease in children under 2-years old is immunization. Studying factors that affect compliance of parents towards immunization especially at time of COVID-19 pandemic is an important issue.

Aim of study: To measure the compliance of parents of children under 2 years towards routine immunization schedule during COVID-19 pandemic.

Methods: A cross-sectional study in the three Primary Health Care centers in Najaf district. A convenient sample of 403 respondents were interviewed through well-prepared questionnaire containing sociodemographic characteristics of parents and children in addition to the effect of COVID-19 on vaccination compliance.

Data analysis was performed by SPSS version 26 using descriptive statistics and chi Square for categorical association at level of significance $\alpha=0.05$.

Results: About 238 (59%) of children completed their immunization schedule per time versus 165 (41%) reported partial immunization. Most respondents were female 257 (63.8%); two third of them with higher educational level 291 (72.2%), with high frequent age group of 25–32 years representing 245 (36%). Educational level, occupation, income, transportation method, distance to PHC, and age of respondents were found significantly associated with completion of child immunization. Most of children were less than one year old 153 (38%). Most of children were born at hospital 353 (87.6%). Age, birth place, contraindication to vaccination, were significantly associated with completed immunization ($P < 0.05$). Most respondents revealed that COVID-19 preventive measures negatively affected immunization timeliness 373 (92.5%), reporting significant relationship with immunization adherence.

Conclusions: Compliance with child vaccinations during covid-19 was suboptimal. The sociodemographic characteristics of respondents had a significant relationship to vaccination status.. Parents were missing knowledge about important information about the contraindications of the vaccines and COVID-19 crisis had a clear impact on vaccination schedule compliance.

Keywords: immunization, PHC , Parents compliance

Introduction

According to world health organization immunization is the process by which activate body's own immune system to prevent the human being from infection or diseases, immunization is very important for a human being generally and for children specifically against the future diseases or infection like poliomyelitis pertussis tetanus ..etc. [1].

The diseases that prevented by vaccination is still the most common causes of childhood death rate all over the world. Where sub-Saharan Africa is responsible for more than 100 deaths in 1000 lives birth [2].

Timely vaccination is widely accepted as a highly successful public health intervention. In the South-East Asia region (SEAR) ,for example, immunization has eliminated transmission of wild polio and maternal and neonatal tetanus, and has significantly reduced the prevalence of measles, Japanese encephalitis, and hepatitis B [3].The historic success in eradicating the dreaded disease, smallpox, prompted the World Health Organization (WHO) to demand its member states release immunization against six vaccine-preventable diseases into the national immunization schedule In May 1974, the World Health Organization(WHO) launched the Expanded Program on Immunization (EPI) on Globally, focusing on the prevention of 6 vaccine-preventable diseases by the year 2000 [4]. The expanded program of immunization firstly performed in Iraq in 1985 [5]. EPI in Iraq have greatly enhance public health care by decreasing the communicable diseases [6].

The immunization schedule in Iraq has been changed many times to achieve optimal benefit against vaccine preventable diseases, the last immunization schedule in Iraq (2019) is shown in the table(1). To achieve the millennium development goal 4 that aimed to decrease the under-5 mortality rate by two-thirds between 1990 and 2015 several intervention done to achieve this goal one of the most important is the immunization campaign many types of immunization program put to overcome this burden [7]. Till now the past two decades the developed countries have a good vaccination coverage in contrast to developing countries [8].

Vaccines had greatly improved health and decreasing the mortality rate, especially among children in low income countries [4]. World Health Organization (WHO) launched the 2030 Immunization Agenda , which aims that immunization will reach every child, everywhere, every time in 2030 . However, encouraging everyone to be vaccinated as influenced by additional challenge posed by the COVID-19 pandemic, which required physical distancing measures to mitigate or delaying the epidemic that directly affected access rate to health care services.The effect of the COVID-19 pandemic on routine immunization was globally notified . The effect is likely to be higher in low- and middle-income countries with limited healthcare resources and fragile health systems [9, 10].

Change in health-seeking behaviors after social distancing measures and lockdowns, and fear of contagion were forcing parents to delay routine childhood vaccinations. At the same time, as health services continued to be overstretched, governments have little choice other than taking drastic measures, including reallocating resources from immunization activities to the COVID-19 response [11] . COVID-19 is not only disease that dealt with while facing challenge to prevent many diseases, where measles outbreak occurs in Democratic Republic of Congo during

period of Ebola epidemic attacking 341 000 people and killed twice as much as Ebola. [12] . The **United Nations Children's Fund** (UNICEF) revealed at 26 April 2020 in Iraq about half of children between age 1 to 2 years old are completed their vaccinations and just two third received vaccine against measles .This happened because of COVID-19 pandemic was more reduced measles vaccinations by 20%, so the most vulnerable children will become at risk of measles outbreak [13].

The factors that affect the immunization program including sociodemographic variables of parents and child demographic factors [6].

Parents knowledge and practices about vaccinations, are very important issues that contribute to their decision regarding immunization of their children [14,15]. Many studies done worldwide revealed that successful immunization of children depending strongly on parents knowledge and positive attitude [16].

Parents compliance leads to full immunization of children which prevent VPD in children and inhibiting any possible immunization defect [17]. Immunization has ,without any doubt, a strong effect on public health worldwide, to obtain this maximally the immunization coverage must reach equal to a certain level for all vaccine prevented disease, achieving this not required just availability of services but also must this service utilized optimally by target population. Despite worldwide success and effect of immunization on human health and life , vaccines are still not optimally utilized, when about 130 million children born yearly but only around 30 million of them still haven't any access to vaccination services[9].

Misconceptions and false beliefs in vaccinations lead to decreased compliance of vaccination [18]. Many studies revealed that parents' knowledge regarding child immunization varies according to the rule of family physician and other medical staff.

Although parents like to know the side effects, the benefits and other information about vaccines, many physicians include vaccine risk in their discussions with parents without comparing the risks involved in infectious diseases [14]. The large amount of confusing information about vaccine side effects and benefits on internet and media can negatively affect parents decisions [19].

Table1: EPI IRAQ 2019 [30]

Age	Vaccine type
Less than a week	OPV0 + HBV + BCG
Two months	OPV1 + pneumococcus + rota + penta
4 months	OPV2 + pneumococcus + rota + penta + IPV1
6 months	OPV3 + pneumococcus + penta + IPV2
9 months	Measles + Vitamin A (100,000 IU)
12 months	MMR
18 months	OPV4 + Vitamin A (200,000 IU) + DPT1 + MMR
4-6 years	OPV5 + Vitamin A (200,000 IU) + DPT2

Aim of study : To assess the compliance of parents to vaccination schedule of their children under two years during COVID 19 outbreak

Methodology

A cross sectional study carried out in three PHC centers at Alnajaf city.(Alnasr , Aljawad,Alatibaa), on the parents attend PHC seeking for treatment of any disease and vaccination of their children.

Sample size :According to the following formula for determination of sample size .
 $n=Z^2 P(1-p)/d^2$, n= sample size

Z= 1.96 which is the corresponding value for the 95% confidence interval

d= the degree of precision was at 0.05

Prevalence = 50 % in order to get large sample size [29, 20]

$$\text{Sample size} = \frac{(1.96)^2 * 0.452 * (1 - 0.452)}{(0.05)^2} = \frac{0.9515}{0.0025} = 380.$$

Inclusion criteria: The parents of children under 2 years

exclusion criteria the parents of children above 2 years

Data collection and time : - The data Collected by using a questionnaire adopted and modified from standard questionnaire and face-to-face interview, needs (15-20) minutes , three to four days per week from (October 2021 – January 2022) [9 ,1]. The data collection form consisted of four parts:

- 1- Socio-demographic characteristics of parents (age, gender, level of education, income, occupation, number of children, marital status).
- 2- Demographic characteristic of children (age, gender, place of birth, contraindication of vaccination).
- 3- Knowledge and practice (KP) of parents towards immunization which fall in 20 questions every correct answer score 1 and incorrect answer score 0 and the respondent categorized into 3 groups ; poor, fair, good. Poor answered < 50%, fair answered = (50-65%), good > 65% [28].
- 4- Vaccination status complete or partial (any missed dose in the timeline of vaccination in child under 2 years old). The information was collected from immunization card or by remembering of vaccination status by parents in case of absence of card.
- 5- Question about COVID 19 preventive measures and its effect on completing EPI (did the measures that taken during COVID-19 period like physical distancing or lockdown affect the immunization status of your children).

Study variables :Dependent variables: immunization status whether complete or partial (any missed dose in vaccination timeline).Independent variables: the social demographic variables (age, gender, occupation, marital status, education level ,No. of children).

Parental knowledge and practice.: Demographic characteristics of child (age, gender, place of birth ,C/I of vaccination). Question about COVID 19 preventive measures and its effect on completing EPI (did the measures that taken during

COVID-19 period like physical distancing or lockdown affect the immunization status of your children).

Data processing and analysis : Data was processed by SPSS version 26 For analysis frequencies and across tabulation was done Chi square test was used to assess the effect of social demographic characteristic of parents, their children and health facility with the categories of dependent variable whether completely or partially immunized at level of significant $\alpha = 0.05$.

Ethical consideration : Verbal agreement were obtained from participants before interview with confidential participation and their information kept in secured private .

RESULTS

In this study 403 respondents were included, 238(59%) of respondent completed their child immunization, versus 165(41%) were partially immunized their children as shown in the figure (1).

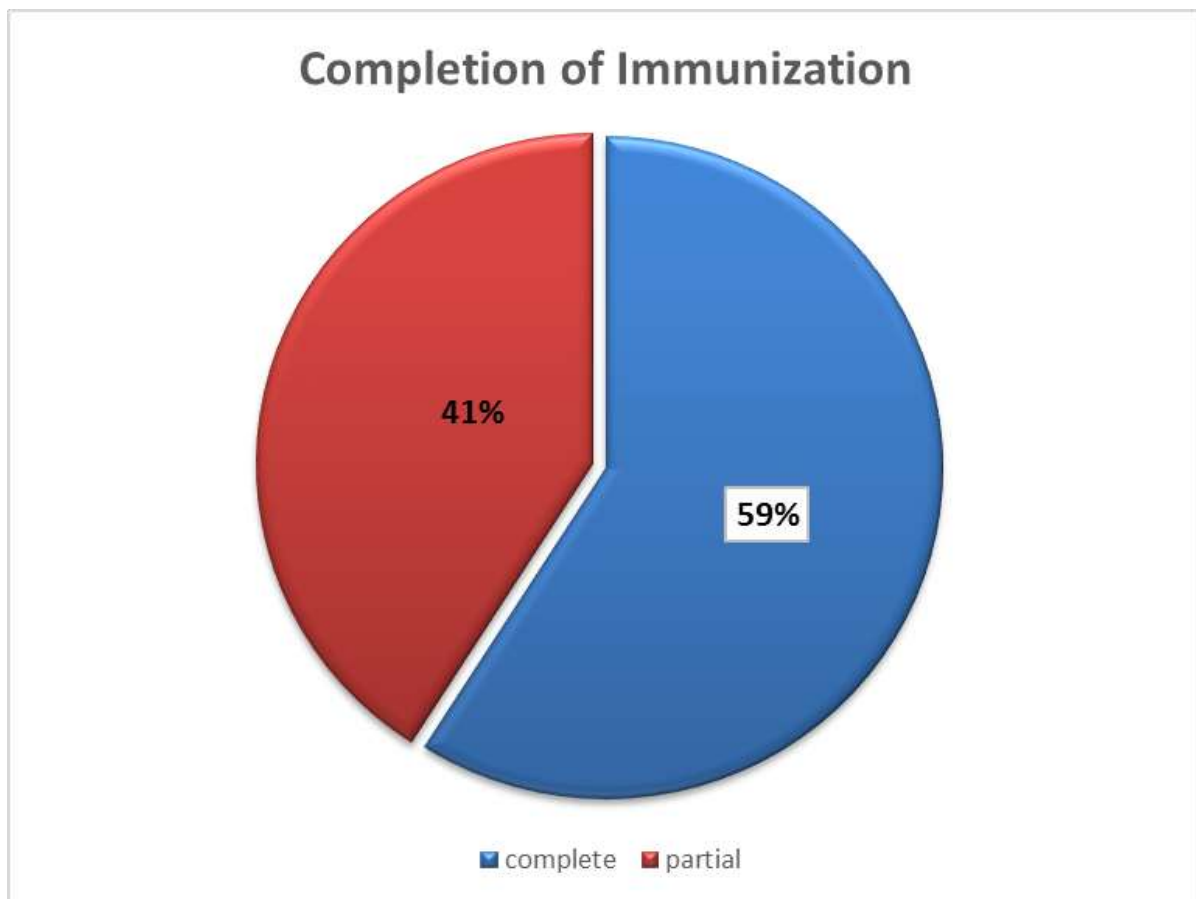


Figure (1) Vaccination status of children

Table 2 revealed that the majority of respondent was female (257) (63.8%), and about 2/3 of respondent have higher educational level. Most of respondents was employed (264) (61%) with housewife (80) (19.9%) more than worker (54) (13.4%). Most of respondent have enough monthly income (297) (73.7%). Regarding to the No. of

children that were about equally distributed one child (89), two child (114), three child (100), four child and more (100).

Table 3 revealed. the gender of children was (209) (51.9%) male, and (194) (48.1%) female, **most** of them (353) (87.6%) was born in hospital or health facility rather than house. Those aged less than one year (153)(38%) ,12-15 months 104(25.8%), 16-19months 65(16.1%) ,20-23 months 81(20.1%). Most of children have no contraindication to vaccination 391 (97%) and only 10 (2.5%) child having severe allergy to some type of vaccine ,and 26(6.5%) child have chronic diseases like CHD or CP ,and only 2(0.5%) child on chemotherapy.

Table 2: Distribution of respondents by socio-demographic characteristics. N=403.

Variables	Frequency	Percent (%)
Type of respondent		
father	128	31.8
mother	275	68.2
Age group (years)		
18-24	63	15.6
25-32	145	36.0
33-38	57	14.1
39-48	138	34.2
Marital status		
widow or divorced	61	15
married	342	85
Educational qualification		
illiterate	18	4.5
primary	36	8.9
secondary	58	14.4
college degree	291	72.2
Occupation		
employee	246	61.0
worker	54	13.4
house wife	80	19.9
unemployed	23	5.7
Average monthly income		
enough	297	73.7
not enough	70	17.4
savable	36	8.9
No. of Children		
one child	89	22.1
two children	114	28.3
three children	100	24.8
four children or more	100	24.8
Transportation method		
Walking	135	33.5
Transport method	268	66.5
Distance in minutes from PHC		
Less than 20 min	304	75.4
20-40 min	82	20.3
40-60 min	17	4.2

Table 3: Distribution of study participants by characteristics of children (N=403).

Variables	Frequency	Percent (%)
Age (months)		
Less than 1 year	153	38.0
12-15 month	104	25.8
16-19 month	65	16.1
20-23 month	81	20.1
Gender		
male	209	51.9
female	194	48.1
Place of birth		
hospital or healthy organization	353	87.6
midwife	50	12.4
contraindication of vaccination		
No contraindication	391	97
Severe allergy to vaccine	10	2.5
Chemo therapy	2	0.5

Table 4 revealed that the effect of socio-demographic characteristics of respondents on completion of immunization where gender, marital status, No. of children have no statistically significant relationship to immunization status (P-value more than 0.05). While their educational level, occupation, income, transportation method, distance in minute to reach PHC, age of respondent all these characteristics are statistically significant on completing immunization (P-value less than 0.05).

Table 4: Effect of socio-demographic characteristics of parents on completion of immunization (N=403).

Variables	Immunization status		Total	P-value
	Complete (%)	Partial (%)		
Type of respondent				
father	74 (57.8)	54 (42.2)	128	0.729
mother	164 (59.6)	111 (40.4)	275	
Marital status				
widow or divorced	35 (57.4)	26 (42.6)	61	0.772
Married	203 (59.4)	139 (40.6)	342	
Education level				
illiterate	4 (22.2)	14 (77.8)	18	0.001
primary	8 (22.2)	28 (77.8)	36	
secondary	30 (51.7)	28 (48.3)	58	
college degree	196 (67.4)	95 (32.6)	291	
occupation				
employee	165 (67.1)	81 (32.9)	246	0.001
worker	26 (48.1)	28 (51.9)	54	
house wife	39 (48.8)	41 (51.3)	80	
unemployed	8 (34.8)	15 (65.2)	23	
income				
enough	186 (62.6)	111 (37.4)	297	0.001
not enough	26 (37.1)	44 (62.9)	70	
savable	26 (72.2)	10 (27.8)	36	
No of children				
one	47 (52.8)	42 (47.2)	89	0.141
two	63 (55.3)	51 (44.7)	114	
three	60 (60)	40 (40)	100	
four	68 (68)	32 (32)	100	
Transportation method				
walking	93 (68.9)	42 (31.1)	135	0.003
transport method	145 (54.1)	123 (45.9)	268	
Distance in minutes				
less than 20 min	192 (63.2)	112 (36.8)	304	0.001
20-40 min	42 (51.2)	40 (48.8)	82	
40-60 min	4 (23.5)	13 (76.5)	17	
Age (year)				
18-24	23 (36.5)	40 (63.5)	63	0.001
25-32	85 (58.6)	60 (41.4)	145	
33-38	36 (63.2)	21 (36.8)	57	
39-48	94 (68.1)	44 (31.9)	138	

Table 5: Distribution of children according to their status of Immunization and some independent characteristics (N=403).

Child age group	Immunization status		Total	P-value
	Complete (%)	Partial (%)		
Less than 1 year	132 (86.3)	21 (13.7)	153	0.001
12-15 month	54 (51.9)	50 (48.1)	104	
16-19 month	23 (35.4)	42 (64.6)	65	
20-23 month	29 (35.8)	52 (64.2)	81	
Child gender				
male	123 (58.9)	86 (41.1)	209	0.931
female	115 (59.3)	79 (40.7)	194	
Birth place				
hospital or healthy origin	223 (63.2)	130 (36.8)	353	0.001
house	15 (30)	35 (70)	50	
C/I of vaccination				
No C/I	231 (63.3)	134 (36.7)	365	0.001
severe allergy to vaccine	0	10 (100)	10	
chronic disease	7 (26.9)	19 (73.1)	26	
chemo therapy	0	2 (100)	2	
Type of health facility				
PHC	210 (58.7)	148 (41.3)	358	0.647
Health Post	28 (62.2)	17 (37.8)	45	

Table (5) shows the effect of some child characteristics on completing immunization where the child age ,birthplace, contraindication of vaccination has related to completing immunization (P-value= 0.001). While child gender ,type of health facility where vaccine taking, had no significant relation for completing immunization (P-value more than 0.05).

Table 6: Correct and incorrect answers of respondents about knowledge and practice of Immunization (N=403).

N.o	Statements	Frequency (%)	
		Correct answer	Incorrect answer
1	immunization prevents communicable diseases	331 (82)	72 (18)
2	Immunization is for all ages.	260 (65)	143 (35)
3	There are many types of vaccines available	393 (97.5)	10 (2.5)
4	Active immunization is a killed or weakened form of a disease-causing agent	310 (77)	93 (23)
5	Passive immunization is an antibody from someone who was infected with the disease	305 (75.7)	98 (24.3)
6	In some health situations the child must not immunized	371 (92.1)	32 (7.9)
7	malnutrition low fever diarrhea are not C/I for vaccine	207 (51.4)	196 (48.6)
8	Vaccines need to be stored at more than 8 degrees Celsius and should not be freezed	318 (79)	85 (21)
9	The product should be used within 72 hours after opening	323 (80)	80 (20)
10	Vaccination is harmful	374 (92.8)	29 (7.2)
11	Are you in favor of immunization	393 (97.5)	10 (2.5)
12	Do you recommend immunization to others	390 (96.8)	13 (3.2)
13	Vaccination should be started in the first week of life	347 (86.1)	56 (13.9)

14	Did you get information about vaccination from health workers?	352 (87.3)	51 (12.7)
15	Did you read about vaccination in the media?	308 (76.4)	95 (23.6)
16	Did you see a television programme about vaccination?	255 (63.3)	148 (36.7)
17	Did you hear about vaccination on the radio?	187 (46.4)	216 (53.6)
18	Did you read about vaccination in the websites?	302 (74.9)	101 (25.1)
19	Did you obtain information about vaccination from an antenatal clinic?	243 (60.3)	160 (39.7)
20	Did you get information about immunization from a maternity hospital or home?	258 (64)	145 (36)

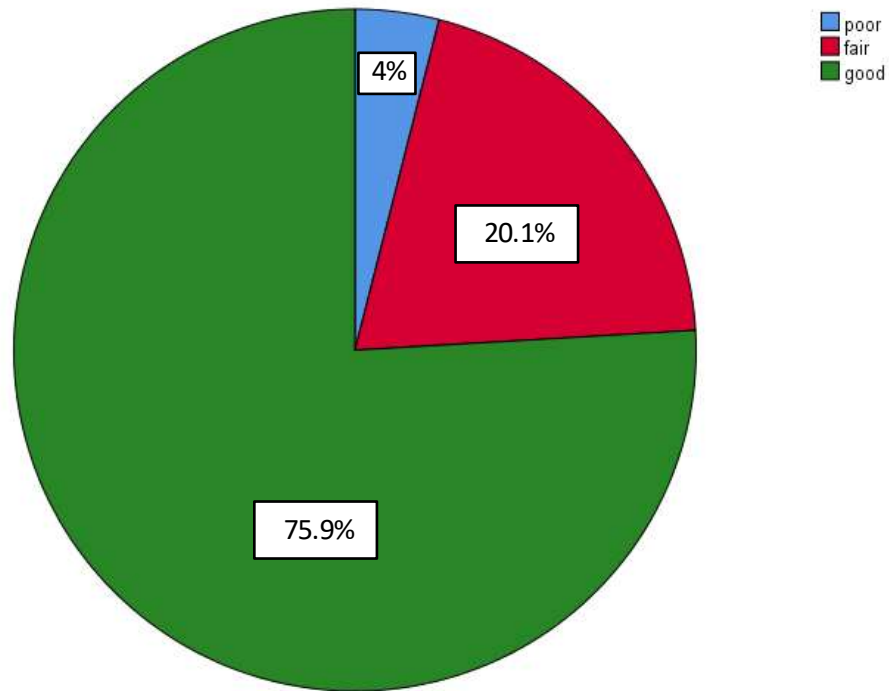


Figure (2). Knowledge and practice of studied parents about vaccination

Table 7: Effect of Knowledge and practice on completing immunization (N=403).

Knowledge and practice	Immunization status		Total	P-value
	Complete (%)	Partial (%)		
poor	4 (25)	12 (75)	16(100)	0.001
fair	34 (42)	47 (58)	81(100)	
good	200 (65.4)	106 (34.6)	306(100)	

Table(7) shows that respondents with good knowledge and practice 200 (65.4%) of them were completely immunized their children,106(34.6%)of them partially immunized their children, fair category 34 (42%) complete immunization 47(58 %) partial and poor category 4 (25%) complete ,12 (75%) partial ,there is a statistical significant relation between knowledge and practice and immunization status.

Table 8: Effect of COVID-19 preventive measures on completing immunization (N=403).

Effect perception	Immunization status		Total	P-value
	Complete (%)	Partial (%)		
Yes	228 (61.1)	145 (38.9)	373 (100)	0.003
No	10 (33.3)	20 (66.7)	30 (100)	

The table(8) shows the percentage of respondent that answered yes or no about the question (did the preventive measures that taken during COVID-19 period like physical distancing or lockdown affect the immunization status of your children) most of them answered yes 373 (92.5%).

The effect of those answered (yes or no) on completing the immunization schedule there is a significant relation (P-value= 0.003).Where 228 (61.1%) who answered yes completed immunization and and 145 (38.9) % partial.

Discussion

Parents knowledge, attitude and practice is the cornerstone factors to decrease the failure rates of immunization and to prevent and control infectious diseases[20],. Many studies showed a clear decline in routine vaccination coverage in many developed and developing countries due to preventive measures of COVID-19 like lockdown, physical distancing, quarantine, and phobia from infection.

The WHO and UNICEF revealed that about 68 countries affected by COVID-19 pandemic , including 80 million children around the world, and many vaccine-preventable disease reappeared in many countries . Polio outbreak in Nigeria, Pakistan, Afghanistan, revealed wild polio infection [21].

The interview composed of questions about immunization knowledge, attitude and practice in addition to sociodemographic characteristics of the child and respondents. Some of these characteristics had a statistical relationship between the vaccination status whether was complete or partial. The socio demographic characteristics of respondents like level of education was significantly related to complete vaccination; which complies with study performed in Cyprus (22, 23). This study was inconsistent with the study done in Saudi Arabia which found there was no relationship between the level of education and vaccination compliance [18],this is may be due to sampling technique or sample size, Type of occupation for the respondent was significantly related to vaccination status, this complies with the study performed in Enugu [23,24], this result may be due to the employee are more aware of the importance about timeline of immunization in addition to the rate of income there was a relationship between the average income of the respondent in terms of its adequacy for completing vaccination.

The age of respondents was significantly related to vaccination compliance and most age category related to completing immunization is 18-25years (P- value= 0.0001) which is consistent with study done in Nigeria university of Lagos [23].Moreover , the means of transportation and distance had an effect on compliance with the vaccine.

The age of the child was one of the clear characteristics that had an impact on the vaccination status ($P= 0.0001$), and the same applies to the place of the child's birth, as well as the child's characteristics in terms of disability and others, where there was a clear effect of these characteristics on vaccination status.

Regarding Knowledge and practice, about 76% of the respondents revealed a good relationship between parental knowledge and practice with compliance to vaccination, whether complete or partial which is similar to a study done in Mosul Iraq [25], and consisted with a published work in Saudi Arabia [26]. About half of the respondents incorrectly answered the question whether ; malnutrition, low grade fever, diarrhea are not contraindications for vaccination of their children. This result corresponded with a finding in a study done in Kashmir ,Srinagar city.[27].

The respondents were asked about COVID 19 preventive measures and completing immunization (Did the measures that taken during COVID 19 pandemic affect completing immunization), most of respondents answered positively and verified significant effect on completing immunization which was consistent with Mohammed MB and Al-Zahrani in Sudan [28].

Conclusions

The compliance with vaccination was suboptimal among attendants of PHC centers.. Factors that significantly affected immunization compliance include: educational level, monthly income, distance to reach PHCCs.

Preventive measures against COVID-19 outbreak like lockdown and physical distancing and the associated public phobia strongly affected vaccination compliance.

Knowledge and practice about vaccination were good among respondents, despite that they were missing some important information about contraindications of vaccines.

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