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Assessment Of Healthcare Workers' Knowledge About Vaccines In Al-Najaf Primary Health Care Centers

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Abstract

Background: Immunization performed an important role in enhancing global health through decreased transmission of infectious diseases. Numerous aspects within healthcare facilities including supervision, cold-chain management, immunization session procedure, and reporting, must be thoroughly examined to ensure the effective delivery of immunization service. **The study aims to** evaluate the knowledge of healthcare workers working in the immunization unit in randomly selected primary healthcare centers at Najaf Province. For s**ubjects and method**, a cross-sectional research descriptive study took place at 26 healthcare facilities at six districts of Najaf, by using simple random sampling. The study involved a total of 143 healthcare personnel, including 122 healthcare workers working in the immunization units and 21 doctors. A questionnaire was used to evaluate the vaccine knowledge of healthcare workers. Data collecting began on December 2nd, 2022, and ended on March 2nd, 2023. The statistical program Statistical Package for Social Sciences/version 26 was used to examine and achieve the desired findings. Analytic statistics of Chi-square test (X2) was used to establish the statistically significant relationship between variables. **Results:** The study's findings revealed that healthcare workers have moderate degrees of overall vaccine knowledge (mean of score =2.23). Furthermore, a statistically significant link was discovered between the place of residence of healthcare workers and their knowledge (P=0.007), indicating that those live-in urban regions had greater knowledge levels than those living in rural areas. **Conclusion:** Healthcare workers possess good knowledge regarding vaccine types, doses, and schedules, moderate knowledge about contraindications and causes of postponement, and their knowledge was substantially associated with their place of residence.

Keywords: Primary health care, Immunization, Al-Najaf, Governorate, Knowledge.

INTRODUCTION

World Health Organization (WHO) defined immunization as a key health service that maintains and protects the health and well-being of populations, and so becomes critical for the effective functioning of governments and economies. Immunization activities should be maintained to ensure optimum continuity during periods of major disruption in the supply of services or consumption(1). It is a method for eradicating and controlling infectious diseases that threaten life, affecting an estimated two to three million children deaths to be avoided every year. Routine vaccination is cost-effective and the most

important public health measure for children(2).

In Iraq, the "Expanded Program on Immunization" was founded in 1985 and has been providing vaccination services for its target groups since that time. Measures of health status have been increasing for two decades, particularly in terms of controlling Vaccine Preventable illnesses, and this represents the high standards of the EPI program's successes(3).

Vaccinations have significantly enhanced world health by limiting the transmission of infectious diseases. Worldwide health organizations such as the World Health Organization (WHO), place a high value on developing and implementing effective immunization programs(4,5).

Despite a large drop in vaccine-preventable diseases in the country, there is a huge gap in vaccination rates and an impressive percentage related to the children who are not vaccinated below one year of age in Iraq, raising the danger of transmission and maintenance of infectious illnesses(6).

Despite evidence indicating that vaccination is among the most successful strategies for avoiding mortality and morbidity from diseases that can be prevented by vaccines throughout the world, vaccination percentages in several countries continue to be low due to the lack of complete knowledge, incorrect beliefs, concerns about side effects, along with vaccine hesitancy among the general public(7).

Vaccinations are normally safe, although they can carry certain risks, and negative reactions to immunization can occur on a few occasions. The public's trust in the safety of vaccinations is seen as vital to the success and efficacy of any immunization programs(8) .

Vaccination processes require health care providers to obtain and maintain the greatest level of competency. Yet, due to a shortage of resources and the constant demand on professionals' time, this procedure is becoming increasingly complex. Knowledge is essential for maintaining complete vaccination programs and improving best practices in everyday work, and the aim is to use this information to enhance immunization session procedures and build vaccinators' skills(9).

Aim of study

The present study aims to assess health workers' knowledge about vaccines in primary healthcare centres (PHCCs) and to determine the association of this knowledge with sociodemographic characteristics.

Materials and Methods

A descriptive, cross-sectional study was carried out at a simple sample of 26 Primary Health Centers selected at random in Najaf Province. Najaf has 52 primary healthcare centers spread across six primary healthcare sectors. The 26 primary healthcare centers (52 % of the total), selected from all sectors at random by using a simple sampling procedure, include: Al-Abbasia, Al-Atebbaa, Al-Jameaa, Al-Naser, Al-Moalemin, Al-Qudus, Misan, Kendah, Al-Qadesiyah, Khula Zowin, Al-Emam Alhasan, Al-mushkhab, Al-noaman, Al-Marasheda, Al-Radhawiyah, Ali Al-Ramahy, Alfaw, Said Al-shohadaa, Al-Emam Al-Jawad, Al-Wafaa, Al-Jamiyah, Mahdy Al-Attar, Al-mutanaby, Hussain Naji, Al-huriyah and Al-Manatherah.

Period of the study

The data collection began on December 2nd , 2022, and to March 2nd, 2023. For each center, 3 days were provided for data collection, which took place on average 5 days per week.

Data collection technique

The data were collected by a **Convenience Sampli**ng Method using a questionnaire that included information from the guideline of Expanded Program Immunization of "World Health Organization" and "The Ministry of Health in Iraq", as well as the advice and

approval from experts, to evaluate the knowledge of health workers about vaccines. The questionnaire consists of the following information:

1- Healthcare worker (HCW) demographic information.
2- Checklist for the knowledge of healthcare workers (HCW) which includes four domains:

•Type of vaccines.

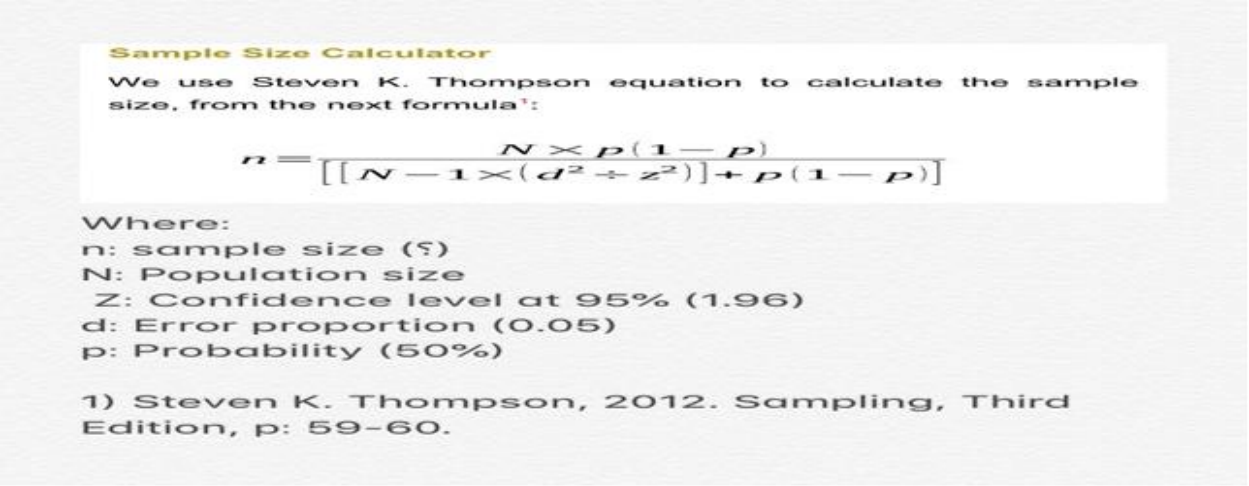
•The number of doses recommended for routine vaccines in the national schedule and the interval between doses.

•General rules for dealing with vaccination dates for children who are late for vaccination.

•Reasons for postponement and contraindication of vaccination

Population of the Study

The population includes all health workers from both genders who work in immunization units, as well as primary healthcare physicians. The sample size for healthcare workers was (143) persons, including (122) vaccinators and (21) doctors. The sample size was selected Depending on the attached equation to choose the appropriate sample size.


Sample Size Calculator

We use Steven K. Thompson equation to calculate the sample size, from the next formula[1]:

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

Where:
n: sample size (?)
N: Population size
Z: Confidence level at 95% (1.96)
d: Error proportion (0.05)
p: Probability (50%)

1) Steven K. Thompson, 2012. Sampling, Third Edition, p: 59-60.

Stephen Thompson equation (10).

Inclusion Criteria

Firstly, at the time of research, the sample includes all the healthcare workers working in the immunization units and the primary healthcare doctors who work in the healthcare centers. Secondly, both genders and all age ranges are represented.

Exclusion Criteria

The staff who refused to be interviewed and all healthcare workers who did not have an administrative order to work in the immunization units were excluded.

Statistical Analysis

The SPSS-26 was employed in data analysis, the data were presented in simple measures of percentage, frequency, standard deviation, and mean, and analytic statistics of Chi-square Test (X2) was used to establish the statistically significant relationship between variables, with findings regarded statistically significant when

a p-value was (<0.05). The differences between observations were judged significant at p≤0.05.

Ethical considerations

The research proposal was submitted to the An-Najaf Al-Ashraf Health Department, Iraq, before beginning data collecting, to acquire the approval. A cover letter with an information sheet outlining the aims of the study and the time necessary to complete the questionnaire was given to all primary healthcare sectors in Najaf Province with an attached consent.

Results

1- Sociodemographic characteristics of healthcare workers

Table 1 presents the sociodemographic characteristics of the studied group, indicating that the majority of workers were between the ages of 20 and 30 years, accounting for 67.8%. In terms of residency, a significant proportion of respondents (73.4%) lived in urban areas. Furthermore, nearly half of the participants (51.7%) held a diploma degree. Among the healthcare workers in the immunization unit of Najaf Province, females constituted 64.3%, whereas males accounted for 35.7%. Regarding experience in the field of vaccination, most healthcare workers (37.8%) had served for 1 to 12 months. Lower percentages were observed for other time periods, including 23.1% for both 13 to 36 months and 61 months and above, and 16.1% for 37 to 60 months. A significant majority of health workers (76%) had participated in the training program on immunization standards. More than one third (38%) of healthcare workers were medical assistants.

Table (1): Sociodemographic characteristics of healthcare workers

Variable (N=143)		F	%
Age in years	20-30	97	67.8
	31-40	18	12.6
	41-50	21	14.7
	51 and above	7	4.9
Gender	Female	92	64.3
	Male	51	35.7
Resident	Urban	105	73.4
	Rural	38	26.6
Level of educational	Diploma	74	51.7
	High school	32	22.4
	PhD	2	1.4
	B.Sc.	28	19.6
	High Diploma	7	4.9
Specialty	Technical Nurse	20	14.0
	Skilled Nurse	31	21.7
	Medical Assistant	55	38.5
	Doctor	21	14.7
	Medical Technologist	16	11.2

Training on immunization	Yes	109	76.2
	No	34	23.8
Experience (months)	1-12 M	54	37.8
	13-36 M	33	23.1
	37-60 M	23	16.1
	61M and above	33	23.1

Evaluation of Knowledge Regarding the Type of vaccines

Table 2 shows the evaluation of healthcare workers in health centers about the types of vaccines, from which the heights average was awarded to question (4) (Measles vaccine is a live-attenuated viral vaccine.) with a mean of 2.50 and std. deviation 0.77, followed by question (5) (Diphtheria and tetanus vaccines are bacterial toxoid vaccines) with a mean of 2.49 and std. deviation 0.80, reading percentages of 67.1% and 67.8% respectively. While the lowest average was awarded to the question (7) (HepB-containing vaccine is a Recombinant DNA or plasmaderived.) with a mean of 2.13 and std. deviation 0.82 , followed by question (10) (Pneumococcal vaccine is a "Conjugate" ("pneumococcal polysaccharide bound to a carrier protein"; does not contain any live bacteria) with a mean of 2.15 and std. deviation 0.80, reading percentages of 40.6% and 39.9% respectively.

A weighted average of the knowledge regarding types of vaccine was 2.36 and std. deviation 0.40 which indicates the trend of (Assessment of Knowledge about Type of vaccines) is high as a general trend according to 3-point Likert scale since 2.36 lie in the interval { 2.24-3.00}. it has been found that most of healthcare workers have high knowledge about the type of vaccines.

Table (2): Types of vaccine

Q	(N=143)	Rating						Mean of Score	Standard Deviation	Assessment
		Disagree		Not sure		Agree				
		F	%	F	%	F	%			
1	There are different types of vaccines, including live and killed ones. There are also bacterial and viral vaccines, and there are also the live attenuated viral and bacterial vaccines	31	21.7	13	9.1	99	69.2	**2.48**	**0.829**	Agree
2	live attenuated vaccines include oral polio vaccine (viral)	29	20.3	16	11.2	98	68.5	**2.48**	**0.812**	Agree
3	injectable polio is killed vaccine	27	18.9	26	18.2	90	62.9	**2.44**	**0.793**	Agree
4	The vaccine for measles is a live attenuated vaccine (viral)	24	16.8	23	16.1	96	67.1	**2.50**	**0.768**	Agree
5	Vaccines for Tetanus and diphtheria are bacterial vaccines (toxoid).	27	18.9	19	13.3	97	67.8	**2.49**	**0.795**	Agree
6	combination vaccines include pentavalent vaccine.	29	20.3	41	28.7	73	51.0	**2.31**	**0.789**	Agree

7	HepB vaccines are manufactured using recombinant DNA or plasma.	40	28.0	45	31.5	58	40.6	**2.13**	**0.821**	Not sure
8	BCG vaccine is a bacterial vaccine that is alive.	34	23.8	19	13.3	90	62.9	**2.39**	**0.848**	Agree
9	The vaccine for rotavirus is a live weakened vaccine. (viral vaccine)	23	16.1	31	21.7	89	62.2	**2.46**	**0.758**	Agree
10	the vaccine for pneumococcal is conjugate vaccines	36	25.2	50	35.0	57	39.9	**2.15**	**0.796**	Not sure
11	The Mumps vaccine is a viral vaccine that has been live attenuated	33	23.1	40	28.0	70	49.0	**2.26**	**0.811**	Agree
12	Rubella is a viral vaccine that has been live attenuated	34	23.8	21	14.7	88	61.5	**2.38**	**0.846**	Agree
13	The pertussis vaccination is acellular or cellular vaccine (bacterial vaccine)	39	27.3	40	28.0	64	44.8	**2.17**	**0.833**	Not sure
	Overall							**2.36**	**0.40**	**high**

*"3-Point Likert Scale { high range (2.24-3.00), moderate range (1.67-2.23), low range (1.00-1.66)}"

Evaluation of the Health Worker's Knowledge of Vaccine Doses in the Routine Schedule of Children's Vaccinations

Table 3 shows the knowledge about the number of doses recommended for routine vaccines in the national schedule and the interval between doses. Out of which the heights average was awarded to the question(8) (Measles vaccine is given in the routine schedule in a single dose at the age of nine months, and it is not given above the age of one year) with a mean of 2.75 and std. deviation 0.63, followed by question (9) (The MMR vaccine is given in the routine schedule in two doses, the first dose at the age of 12 months and the second at the age of 18 months, and it is not given at the age of less than a year), with a mean of 2.73 and std. deviation 0.65, reading percentages of 85.3 % and 84.6 % respectively. While the lowest average was awarded to the question (2) (The hepatitis B vaccine is given in four doses (the birth dose within 24 hours of childbirth and a dose at the age of two months, four months and six months with the pentavalent vaccine, at an interval of no less than four weeks) with a mean of 2.23 and std. deviation 0.94, reading a percentage of 58.0%. A weighted average of section 2 was 2.52 and std. deviation 0.45 which indicate the trend that (Assessment of Knowledge About the Number of Doses Recommended for Routine Vaccines in The National Schedule and The Interval Between Doses) is high as a general trend according to 3-point Likert scale since 2.52 lie in the interval { 2.24-3.00}.

Table (3): Knowledge of Vaccine Doses in the Routine Schedule of Children's Vaccinations

Q	(N=143)	Rating						Mean of Score	Standard Deviation	Assessment
		Disagree		Not sure		Agree				
		F	%	F	%	F	%			
1	BCG is administered within the 1st week of life, and not given after one	20	14.0	3	2.1	120	83.9	2.70	0.702	Agree

	year of the child's age									
2	The vaccine of hepatitis B is administered in four doses (24 hours after birth as well as at 2,4, and 6 months,(The minimum period between vaccines doses is 4 weeks.)	50	35.0	10	7.0	83	58.0	2.23	0.940	Not sure
3	oral polio vaccine (OPV vaccine) is administered in 6 doses (zero dose at the first week of life and 3 administrations at the ages of 2,4, and 6 months,(The minimum period between vaccines doses is 4 weeks), plus two booster doses given at the ages of 4-6 years and 18 months.	31	21.7	6	4.2	106	74.1	2.52	0.829	Agree
4	The vaccine of injectable polio is administered at 4 and 6 months of life (The minimum period between vaccines doses is 4 weeks)	28	19.6	7	4.9	108	75.5	2.56	0.802	Agree
5	pentavalent vaccine is administered at 2,4, and 6 months ,(The minimum period between vaccines doses is 4 weeks)	29	20.3	8	5.6	106	74.1	2.54	0.812	Agree
6	The pneumococcal vaccine is administered at 2,4, and 6 months ,(The minimum period between vaccines doses is 4 weeks)	30	21.0	26	18.2	87	60.8	2.40	0.815	Agree
7	Rotavirus vaccine is administered in 2 or 3 doses, according to the type of vaccine administered.	39	27.3	13	9.1	91	63.6	2.36	0.884	Agree
8	The measles vaccine is administered in a single dose at age of 9 months	15	10.5	6	4.2	122	85.3	2.75	0.633	Agree
9	The MMR vaccination is provided in two doses at ages of 12 months and 18 months.	16	11.2	6	4.2	121	84.6	2.73	0.649	Agree
10	trivalent vaccine administered at the ages of 4-6 years and 18 months.	34	23.8	17	11.9	92	64.3	2.41	0.850	Agree
	Overall							**2.52**	**0.45**	**high**

*"3-Point Likert Scale { high range (2.24-3.00), moderate range (1.67-2.23), low range (1.00-1.66)}"

Evaluation of Knowledge regarding Reasons for Postponement and Contraindication

Table 4 provides an overview of healthcare workers' knowledge regarding reasons for delaying vaccines and contraindication. The weighted average for this domain was 2.11, with a standard deviation of 0.39. These figures suggest that the assessment of knowledge concerning contraindications and reasons for postponing vaccines is moderate, according to the 3-point Likert scale, as 2.11 falls within the range of 1.67-2.23.

Table (4): Reason for Postponement and Contraindications of Vaccination

Q	(N=143)	Rating						Mean of Score	Standard Deviation	Assessment
		Disagree		Not sure		Agree				
		F	%	F	%	F	%			
1	Vascular shock or acute allergy caused by a previous injection of an exact vaccine.	22	15.4	14	9.8	107	74.8	2.59	0.743	Agree
2	Fever after the previous dosage is not considered a contraindication to vaccination.	68	47.6	9	6.3	66	46.2	1.99	0.971	Not sure
3	Contraindications include hypersensitivity to a specific component in the vaccine.	26	18.2	11	7.7	106	74.1	2.56	0.784	Agree
4	Otitis media with no fever is not considered a vaccine contraindications	87	60.8	16	11.2	40	28.0	1.67	0.886	Not sure
5	A family history of bad reactions to pertussis vaccine doses is not a contraindication to vaccination.	45	31.5	37	25.9	61	42.7	2.11	0.857	Not sure
6	Minor diseases, like upper respiratory infection and diarrhea, not prevent vaccination.	79	55.2	17	11.9	47	32.9	1.78	0.915	Not sure
7	A serious side effect of certain vaccines in the previous dose consider a contraindication to that vaccines	33	23.1	22	15.4	88	61.5	2.38	0.839	Agree
8	well-controlled epilepsy is not regarded as a contraindication to vaccination.	64	44.8	30	21.0	49	34.3	1.90	0.886	Not sure
9	If the child's temperature increases above 38.5 C , vaccinations will be delayed.	27	18.9	8	5.6	108	75.5	2.57	0.792	Agree
10	The immunization is postponed if a kid has a serious or neutral acute sickness.	21	14.7	18	12.6	104	72.7	2.58	0.736	Agree
11	Live attenuated vaccination is not provided in the case of immunodeficiency illnesses.	23	16.1	24	16.8	96	67.1	2.51	0.759	Agree
12	Asthma, allergies, or allergic symptoms, as well as Hey fever, are not regarded contraindications to vaccination.	73	51.0	27	18.9	43	30.1	1.79	0.879	Not sure
13	Premature newborns (babies born before 37 weeks of age) can receive the vaccine.	47	32.9	20	14.0	76	53.1	2.20	0.908	Not sure
14	Malnutrition is not a reason to avoid	70	49.0	27	18.9	46	32.2	1.83	0.888	Not sure

	a vaccine.									
15	seizures in family history are not a contraindication to receiving a vaccination.	53	37.1	36	25.2	54	37.8	2.01	0.868	Not sure
16	low-dose corticosteroids ,antibiotics, , or short-acting steroids are not considered contraindications to vaccination.	44	30.8	36	25.2	63	44.1	2.13	0.858	Not sure
17	Eczema, dermatitis, or a topical infection of the skin are not regarded as contraindications to vaccination.	89	62.2	14	9.8	40	28.0	1.66	0.889	Disagree
18	Chronic lung , heart, kidney, as well as liver problems are not considered contraindications to vaccination.	77	53.8	18	12.6	48	33.6	1.80	0.916	Not sure
19	Down syndrome or cerebral palsy , do not prevent vaccination.	73	51.0	28	19.6	42	29.4	1.78	0.873	Not sure
20	Jaundice shortly after birth is not considered a contraindication to immunization.	64	44.8	17	11.9	62	43.4	1.99	0.942	Not sure
21	Children with low birth weight are not regarded as contraindications to vaccination.	51	35.7	27	18.9	65	45.5	2.10	0.898	Not sure
22	In the case of using steroids for 14 days or getting blood or its derivatives, the immunization will be delayed for three months.	18	12.6	41	28.7	84	58.7	2.46	0.710	Agree
	Overall							**2.11**	**0.39**	**moderate**

*"3-Point Likert Scale { high range (2.24-3.00), moderate range (1.67-2.23), low range (1.00-1.66) }"

Relationship of Overall Knowledge Regarding Vaccination with Sociodemographic Characteristics.

Table 5 provides insights into the relationship between demographic variables and the levels of knowledge observed in the sample. Statistical analysis revealed no significant association with age (P=0.719), gender(P=0.257), and educational level (P=0.266). The variables examined also included specialization level, years of experience in the field of vaccination. According to the findings, there is no significant relationship between these occupational characteristics including (years of experience at the immunization unit and specialization level) and overall knowledge of healthcare workers. In terms of residency, the findings show that a higher percentage of healthcare workers from urban areas (27.3%) displayed good knowledge compared to those in rural areas (3.5%). This difference has been determined to be statistically significant (P-value equal to 0.007).

Table (5): Relationship of Sociodemographic Characteristics of Participants with Overall Knowledge on Vaccines

Variables		Rating						Chi square ($\chi 2$)	P. value	Sig
		F	Disagree (%)	F	Neutral (%)	F	Agree (%)			
Age (year)	30-20	1	0.7%	69	48.3%	27	18.9%	3.686	0.719	Non-Significant
	31-40	0	0.0%	11	7.7%	7	4.9%			
	41-50	0	0.0%	12	8.4%	9	6.3%			
	51 and above	0	0.0%	6	4.2%	1	0.7%			
Gender	Female	0	0.0%	66	46.2%	26	18.2%	2.719	0.257	Non-Significant
	Male	1	0.7%	32	22.4%	18	12.6%			
Resident	Urban	0	0.0%	66	46.2%	39	27.3%	**9.836a**	**0.007**	**Significant**
	Rural	1	0.7%	32	22.4%	5	3.5%			
Level of Educational	Diploma	1	0.7%	46	32.2%	27	18.9%	9.982	0.266	Non-Significant
	High school	0	0.0%	20	14.0%	12	8.4%			
	PhD	0	0.0%	1	0.7%	1	0.7%			
	B.Sc.	0	0.0%	24	16.8%	4	2.8%			
	High Diploma	0	0.0%	7	4.9%	0	0.0%			
Specialty	Technical Nurse	0	0.0%	12	8.4%	8	5.6%	9.371a	0.312	Non-Significant
	Skilled Nurse	0	0.0%	19	13.3%	12	4.8%			
	Medical Assistant	1	0.7%	35	24.5%	19	13.3%			
	Doctor	0	0.0%	19	13.3%	2	1.4%			
	Medical Technologist	0	0.0%	13	9.1%	3	2.1%			
Training on Immunization	Yes	1	0.7%	72	50.3%	36	25.2%	1482a	0.477	Non-Significant

	No	0	0.0%	26	18.2%	8	5.6%			
Experience (months)	1-12 M	0	0.0%	37	25.9%	17	11.9%	6.393[a]	0.381	Non-Significant
	13-36 M	0	0.0%	21	14.7%	12	8.4%			
	37-60 M	1	0.7%	17	11.9%	5	3.5%			
	61M and Above	0	0.0%	23	16.1%	10	7.0%			

Discussion

In this study, it has been observed that the majority of primary healthcare employees in Najaf were young and newly appointed. Additionally, most participants held a diploma degree. The study has also revealed that the majority of healthcare workers in the immunization units of Najaf were females (64.3%) while the males have accounted for 35.7%. This may be attributed to the fact that dealing with women, especially in Najaf, is simpler in the context of bringing their children to the health center, considering societal characteristics. Furthermore, a significant percentage (76%) of healthcare workers had participated in a training program on immunization standards. This can be attributed to ongoing training provided by the state's public health department. In terms of specialization, most healthcare workers were in the medical assistant specialty. Regarding knowledge about types of vaccines, the study has found that most healthcare workers had a high level of knowledge. This was due to several reasons, including Health workers undergo formal education and training in medical or nursing schools, which includes comprehensive coursework on vaccines and immunization, Health workers engage in continuous professional development activities, such as attending workshops, seminars, and conferences focused on vaccines and immunization, Primary health care centers typically have standardized protocols and guidelines for vaccine administration, Health centers often have quality assurance mechanisms in place, including regular supervision and monitoring.

The present findings are similar to a study conducted by Hashim et al. (2020) who found that the knowledge of health center workers about vaccines was good. The study, which was conducted in Iraq, involved 308 health center workers who were interviewed using a questionnaire. The results showed that the majority of the health center workers had good knowledge about vaccines, including their types, indications, and adverse effects (11). Regarding the knowledge about the number of doses recommended for routine vaccines in the national schedule and the interval between doses, healthcare workers have high knowledge about this subject. This may be due to Availability of the schedule of routine vaccinations hanging inside the room of the immunization unit and the abundance of training on it, in addition to the continuous practice of vaccination. This finding is consistent with previous studies that have also assessed the knowledge of healthcare workers about vaccines in different countries and settings. For instance, a study by Al Khaldi et al. (2019) found that healthcare workers in Saudi Arabia had good knowledge about vaccines, with over 90% of them being able to correctly identify the vaccines included in the national immunization program(12). However, when it came to knowledge about handling late vaccination dates for children, healthcare workers had a moderate level of knowledge. This finding is consistent with a study conducted in Ghana, which found that healthcare workers' knowledge about handling children who were late for vaccination was moderate [12]. Health care workers have a moderate level of knowledge regarding the reasons for postponement and contraindication of vaccination. This may be due to a lack of resources or time, as well as a lack of awareness of the importance of this topic as

well as Direct dependence on the doctor regarding this matter. This result is similar to a recent study by Al-Obaidi et al. (2020) which aimed to assess the knowledge of healthcare workers in Iraq about the side effects of vaccines. The study involved 300 healthcare workers from different healthcare settings across Iraq, who were surveyed using a structured questionnaire. The results showed that the overall knowledge of healthcare workers about the side effects of vaccines was moderate. While most of the healthcare workers had a good understanding of the benefits of vaccines, their knowledge about the side effects was only moderate(13). Another study by Abdulrazzaq et al. (2014) found that healthcare workers in Iraq had moderate knowledge about the immunization schedule and the side effects of vaccines(14). The general final assessment of overall knowledge of the healthcare workers was moderate. This suggest that the health care worker is not familiar with the comprehensive guide to the expanded program for immunization, or maybe due to weak training program. These findings are consistent with another study conducted by Metwali, F., et al.(2019) in El-Hossania City at Sharkia Governorate, it shows not adequate knowledge about vaccination; this result may be due to weakness in training program content (15). Higher percentage of healthcare workers from urban areas displayed good knowledge compared to those in rural areas, It is likely due to the majority of health workers in the health care centers in rural areas are residents of the same rural area and because of the remoteness of these centers and their presence in remote areas and the difficulty of their access to training centers that are always in the city center. The present findings are similar to a study conducted by Mohamed Zayed et al.,(2022) which included 150 healthcare worker in 16 primary healthcare centers in Egypt, for the assessment of the knowledge of healthcare workers. The study found a significant association between healthcare workers knowledge levels and Residents (16). Another study that disagrees with the results of the present study was conducted in primary healthcare centers of Nigeria by Adebimpe, et al.,(2021); it found those practicing in rural areas were found to have better knowledge than those in urban areas (17). Another study agreed with the recent findings about the number of years in the vaccination field was conducted in Benin City, Edo State, Nigeria by Uwaibi, N. E. (2018) for the evaluation of the implementation of routine childhood immunization services at the primary health care centers, the study found that there is no significant relationship between health care workers knowledge about immunization and years of experience in the field of immunization(18).

Conclusion

Healthcare workers possess good knowledge regarding vaccine types, doses, and schedules, moderate knowledge about contraindications and causes of postponement, possibly due to their lack of familiarity with the comprehensive guide to the expanded program of immunization. Additionally, the knowledge of healthcare workers was strongly related to their residences place.

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