



ORIGINAL ARTICLE

Primary Healthcare Physicians' Knowledge, Practice, and Attitude Towards Influenza Vaccination of Pregnant Women in Bahrain

Fatema K. Bindayna¹, Noora A. AlHammadi^{1*}, Noora K. Bindayna¹, Qoot A. Alboainain¹, Mustafa M. EzzlArab¹, Behnaz E. Tadayyon²

¹Family Physicians, Ministry of Health, Manama, Kingdom of Bahrain.

²Consultant Family Physician, Consultant Medical Tutor - Family Residency Program and RCSI, Ministry of Health, Manama, Kingdom of Bahrain.

*Corresponding Author:

Dr. Noora Ahmed AlHammadi, Family Physician, Ministry of Health, Manama, Kingdom of Bahrain;
Tel: (+973) 38881166; Email: Nalhammadi.09@gmail.com

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Abstract

Background: Pregnancy is associated with immunological and physiological changes in many organ systems. Influenza in pregnancy has been associated with higher rates of morbidity and mortality. The Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) advocate antenatal influenza vaccination.

Objective: This study aims to assess Primary Healthcare Physicians' (PHPs) knowledge, practice, and attitude regarding influenza vaccination of pregnant women in Bahrain. Also, to identify the perceived facilitators and barriers to influenza vaccination for pregnant women among PHPs.

Methodology: A cross-sectional study was conducted in all Primary Health Centers (PHCs) in Bahrain belonging to the Ministry of Health (MOH), which included 25 PHCs and 3 health clinics spread across five health regions. One hundred and eighty-two physicians responded to a survey about their awareness, practice, and attitude about influenza immunization in pregnancy.

Conclusion: In general, physicians agree that influenza vaccination is necessary and safe for all pregnant women, not only those having high-risk pregnancies. Furthermore, good counseling can help overcome many fears or barriers.

Keywords: Bahrain, Counseling, Fear, Female, Influenza, Human, Morbidity, Physicians, Pregnancy, Pregnant women, Vaccination

Introduction

Pregnancy is concomitant with immunological and physiological changes in many organ systems.¹ These modifications may affect the immune system's response to influenza virus infection.²

Literature on previous influenza pandemics in 1918, 1957, and 2009 has demonstrated that

pregnant women were at high risk of developing complications such as pneumonia, respiratory failure, intensive care admission, sepsis, and even death.³ The likelihood of hospitalization in pregnant women is 18 times higher.⁴ Comorbid conditions, such as diabetes, asthma, chronic cardiac or renal disease, obesity, and immunosuppressive disorders

in pregnant women, increase the likelihood of morbidity.⁵ Additionally, women who developed influenza during pregnancy have a higher risk of perinatal complications such as preterm delivery and low fetal birth weight.⁶

The influenza vaccine in pregnancy is a very effective strategy to prevent severe influenza illness and serious complications and reduces up to 40 % of hospitalization.⁷ It also protects the infant for the first few months of life.⁶

The safety of inactivated influenza vaccination in pregnancy for birth outcomes was studied in a systematic review.⁸ According to this study, influenza vaccination during pregnancy is safe, specifically against preterm birth, low birth weight, small for gestational age, congenital abnormalities, spontaneous abortion, or stillbirth. Moreover, the study also established a protective effect against preterm birth and low birth weight.⁸

In Saudi Arabia, two studies (Al Ahsaa in 2019-2020 and Al Khobar/Al Dammam in 2017-2018) showed low vaccine uptake rates among pregnant women (at 20.3% and 19.8% respectively).⁹

The North Dublin City GP Training Program conducted a quantitative study in Ireland which showed that healthcare physicians have a good knowledge of vaccination recommendations (96.6%) but little knowledge of the possible consequences of infection on the fetus (52.1%).¹⁰

In 2017, healthcare workers in Thailand were surveyed about their attitudes toward influenza vaccination during pregnancy. The study concluded that 75% of physicians expressed a favorable attitude towards the vaccination, but only 25% of them offered it to pregnant women.⁶

A cross-sectional study done in Managua and Nicaragua on pregnant women showed a positive perception and uptake of the influenza vaccine after the recommendation by their healthcare provider.¹¹ Another study in Saudi Arabia stated that pregnant women concerned about vaccine safety admitted that they would take the vaccine if their healthcare providers offered it.¹²

The CDC Advisory Committee on Immunization Practices and the American College of Obstetricians

and Gynecologists (ACOG) recommend that all adults receive an annual influenza vaccine and that women who are or will be pregnant during influenza season receive an inactivated influenza vaccine as soon as it is available.^{2,13} In Bahrain, inactivated influenza vaccination for pregnant women in all trimesters has been implemented by the MOH since 2009. This recommendation has been reemphasized in the Bahrain Antenatal Clinics Guidelines (2010, 2019).¹⁴

The researchers decided to conduct this research to assess PCPs' knowledge, practice, attitude, facilitators, and perceived barriers regarding influenza vaccination of pregnant women in Bahrain to reduce maternal morbidity and mortality associated with influenza during pregnancy.

Method

Study design

Cross-sectional study

Setting

All Primary Health Centers (PHCs) in Bahrain belonging to the Ministry of Health (MOH), which included 25 PHCs and 3 health clinics spread across five health regions.

Sample population

A list of all PCPs attending morning or afternoon duties in PHCs, including Family Physicians (FPs) and General Practitioners (GPs), was obtained from the Human Resources office of the Ministry of Health in Bahrain. It included around 350 physicians. The study involved FPs who worked part-time in health centers as well.

Sample size

All PCPs, including FP and GPs, attended morning or afternoon duties in PHCs during the study period, from the first of June till the 13th 2021. Those who declined to participate were considered non-responders, 158 out of 350.

Study variables and instrument

An online survey containing 16 questions was used to conduct the study. The questionnaire was obtained from a previous study that was done in Ireland in 2017-18, which was approved by the Rotunda Hospital Research Ethics Committee.¹⁵ The author

consented to respond and share the questionnaire for research publication.

The following information was collected from each participant:

- Demographic data: health care provider role, sex, and years of practice. Participants' ages were not collected.
- Knowledge regarding influenza vaccines during pregnancy
- Attitude towards prescribing influenza vaccines to pregnant women, health care providers, and oneself.
- Factors that encourage pregnant women to receive influenza vaccination.
- Barriers to administering the influenza vaccination to pregnant women.

Categorical and Likert-type responses were used in the questionnaire.

Data collection procedure

Data were collected over two weeks using an online survey from the first to the 13th of June 2021. The participating physicians were approached through their health center's head, as their contact details were not readily available to human resources. The study's objectives have been explained to the head of each PHC. The head then distributed the questionnaires to his/her center doctors electronically. Even those who were on leave were invited to participate. Two reminder messages were sent to the PHCs with low response rates.

Ethical consideration and confidentiality

Permission was obtained from the original study's corresponding author to use the questionnaire. Participants granted consent and responded to the questionnaire. The questionnaires were anonymous, and confidentiality was maintained. Permission and ethical approval were obtained from Bahrain MOH's Primary Care Research & Ethics committee.

Results

Data processing and analysis

Data were entered in a database program (SPSS 27.0). Descriptive analysis was carried out. The

responses were displayed in frequencies and percentages.

Chi-square test was done to test the association between the knowledge and attitudes of the physicians against their demographic parameters (sex, years of experience, healthcare provider role). Responses on the Likert scale were divided into two groups: strongly agree & agree responses in one group; and neutral, disagree & strongly disagree responses in the other. $P < 0.05$ was considered significant.

Demographic data

The questionnaire was sent to 350 PCPs, and 192 responded, giving a response rate of 55%. Table 1 shows the participants' characteristics. Female physicians represented 87% of the practicing doctors. Around forty-two percent of the participants had less than 10 years of post-internship experience. Respondents' mean years of practice was 14 years (SD=8.6 years). Among the 192 doctors studied, 167(87%) were FPs who worked full-time in health centers, followed by FPs who worked part-time in health centers (7.3%) and GPs (5.7%).

Table 1: Demographic (sex) and professional characteristics. Values are numbers (%) N=192

Demographic characteristic	N (%)
Sex	
Male	25 (13)
Female	167 (87)
* Years in practice after internship	
<10	80 (41.7)
10 - 19	61 (31.8)
≥ 20	51 (26.5)
Professional Title	
Family physician in health center	167 (87)
Family physician in other departments	14 (7.3)
General practitioner	11 (5.7)

*The mean years of practice is 14 ± 8.6

Knowledge of influenza vaccine in pregnancy

Table 2 shows the general level of knowledge about the influenza vaccine in pregnancy. Among the 192 respondents, 65% of respondents stated that influenza during pregnancy increased maternal complications and 56.3% respondents agreed to fetal complications.

Of the 192 respondents, 178(92.7%) agreed that vaccination was an important preventative measure in reducing complications and that influenza vaccination is considered safe in pregnancy (90.1%).

According to 93.8% to 79.2% of respondents, influenza vaccination during pregnancy reduced the risk of hospitalization, ICU admission, maternal death, preterm delivery, miscarriage, and fetal death. Furthermore, 88.0% agreed that influenza vaccination is recommended for all pregnant women during the flu season, regardless of other co-morbidities. Seventy-nine percent of physicians agreed that the Influenza vaccine is recommended in all trimesters.

Table 2: Knowledge of influenza vaccine in pregnancy. Values are numbers (%) N=192

	Agree/ YES, N (%)
Influenza during pregnancy is associated with an increased risk of maternal complications.	125 (65.1)
Influenza during pregnancy is associated with an increased risk of fetal complications.	108 (56.3)
Vaccination is an important preventative measure in reducing complications.	178 (92.7)
Influenza vaccination is considered safe in pregnancy.	173 (90.1)
<i>Influenza vaccination during pregnancy prevented</i>	
Increased maternal hospitalization	180 (93.8)
Increased maternal ICU admissions	171 (89.1)
Maternal death	162 (84.4)
Preterm delivery	163 (84.9)
Miscarriage	153 (79.7)
Fetal death	152 (79.2)
Influenza vaccination is recommended for all pregnant women during the flu season.	169 (88.0)
Influenza vaccination is recommended for only pregnant women with other co-morbidities during flu season.	28 (14.6)
Influenza vaccine is recommended in all trimesters.	152 (79.2)

Practices and attitudes toward influenza vaccine

The data presented in Table 3 show PCPs' practices and attitudes toward influenza vaccination in pregnancy, practice, and attitudes toward influenza

vaccination for self-care and healthcare workers, factors encouraging pregnant women to receive influenza vaccination, reasons not to recommend influenza vaccination in pregnancy, and information sources.

Table 3: Attitude towards influenza vaccine in pregnancy. Values are numbers (%) N=192

	Agree/ YES, N (%)
<i>Practices and attitudes toward influenza vaccination in pregnancy</i>	
It is my responsibility to discuss vaccination with all pregnant women during the flu season.	184 (95.8)
It is my responsibility to offer vaccination with all pregnant women during the flu season.	176 (91.7)
It is my responsibility to discuss vaccination with only high-risk pregnant women during the flu season.	68 (35.4)
It is my responsibility to offer vaccination to only high-risk pregnant women during the flu season.	65 (33.9)
I feel confident recommending influenza vaccination, as I believe it to be safe during pregnancy.	176 (91.7)
As a healthcare provider, do you recommend influenza vaccination to pregnant women during flu season?	178 (92.7)
<i>In your view, where should pregnant women be given the influenza vaccine?</i>	
Hospital	3 (1.6)
Health center	122 (63.5)
Either	67 (34.9)
<i>Practice and attitudes toward influenza vaccination for self-care and healthcare workers</i>	
As a healthcare provider, have you received the influenza vaccine in the past 12 months?	119 (62)
If no, do you intend on taking the influenza vaccine? (N=73)	
Do you believe that all healthcare providers should be immunized against influenza?	182 (94.8)
<i>Factors encouraging pregnant women to receive influenza vaccination</i>	
Recommendations from patient's obstetrician	191 (99.5)
Strong doctor-patient relationship	189 (98.4)
Patient's risk factors for disease	188 (97.9)

Health professional having sufficient time to counsel patients on vaccination	187 (97.4)
Recommendations from patients GP	175 (91.1)
Reasons for not recommending influenza vaccine for pregnant patients	
Mother refusal	10 (5.2)
Fear of safety on mother	9 (4.7)
Fear of safety on fetus	9 (4.7)
Lack of knowledge	7 (3.6)
Lack of effectiveness of this vaccine	3 (1.6)
Other	4 (2.1)
Sources of information	
Medical literature	143 (74.5)
Presence of local guideline	117 (60.9)
Attendance at Continuing Medical Education/CME	114 (59.4)
Discussion with colleagues	90 (46.9)
Past experience	74 (38.5)

*No response

Practices and attitudes toward influenza vaccination in pregnancy

During the flu season, (95.8%) physicians believed it was their responsibility to discuss and offer (91.7%) influenza vaccines to all pregnant women. Thirty-five percent believed raising the topic with high-risk mothers only was sufficient. The influenza vaccine was also considered safe during pregnancy, according to 91.7% of the physicians. Among the 192 physicians, 178 (92.7%) stated they would recommend influenza vaccine for pregnant women during flu season. In addition, 63% of physicians thought these women should be vaccinated at health centers and 1.6% thought they should be vaccinated at hospitals, while 34.9% thought both locations were acceptable.

Practice and attitudes toward influenza vaccination for self-care and healthcare workers

Sixty-two percent of the surveyed physicians had received their influenza vaccination within the past 12 months. Of the 192 surveyed physicians, 73 had not had it yet, though, (72.6%) intended to take it. Ninety-four-point eight percent of physicians agreed that all healthcare providers should be immunized against influenza.

Factors encouraging pregnant women to receive influenza vaccination

In the survey, (99.5%) physicians agreed that the most persuasive factor motivating pregnant patients to take the influenza vaccine was recommendations from their obstetricians, as opposed to recommendations from their GPs (91.1%). Other factors included a strong doctor-patient relationship (98.4%), a patient's risk factors for disease (97.9%), and sufficient time from the health professional to counsel patients on vaccination (97.4%).

Reasons for not recommending influenza vaccine for pregnant patients

Five percent of respondents identified mother refusal as a barrier, and less than 5% identified fear of safety for the mother, fear of safety for the fetus, lack of knowledge, and lack of effectiveness of this vaccine as a barrier.

Information sources

Regarding sources of information, seventy-five percent were found to be from the medical literature (74.5%), followed by sixty-one percent from local guidelines (60.9%), fifty-nine percent from attendance of Continuing Medical Education (CME) (59.4%), forty-seven percent from discussion with colleagues (46.9%), and thirty-eight percent from experience (38.5%).

Relationship between demographic characteristics and knowledge among physicians

The correlation between demographic characteristics and doctors' knowledge is explored in Table 4. No significant associations were found between the demographic variables and the knowledge of doctors regarding the association of influenza with an increased risk of maternal or fetal complications. Regarding vaccination as a preventative measure to reduce fetal complications and vaccination safety, FPs showed significantly greater agreement (93.9% and 92.3%, respectively) than GPs (72.7% and 54.5%, respectively) with a significant p-value of $P=0.009$ and $P=0.001$ respectively. The years of experience or the sex of the physician had no associations with either of these parameters.

A comparison of physicians' knowledge of the consequences of non-vaccination revealed no significant difference except for the years of experience. Those with less than 10 years' experience identified a notable number of increased maternal Intensive Care Unit (ICU) admissions (96.3%) and miscarriages (85%) prevented as compare with more years of experience.

It was statistically significant that more FPs (89.5%) than GPs (63.6%) recommended the influenza

vaccine to all pregnant women during the flu season ($P = 0.010$). However, those with less than 10 years of experience disagreed with limiting the vaccine to pregnant women with co-morbidities (90%) than those with more than 10 years of experience ($P = 0.035$). FPs (81.8%) were more likely than GPs (63.6%) to recommend the influenza vaccine in all trimesters of pregnancy ($P = 0.001$).

Table 4: Relationship between demographic characteristics and knowledge among physicians. Values are numbers (%). N=192

	Number of years in practice after internship			Professional Title		Sex	
	<10	10 – 19		Family physician	General physician	Male	Female
	n=80	n=61	n=51	n=181	n=11	n=25	n=167
<i>Influenza during pregnancy is associated with an increased risk of maternal complications</i>							
Agree, N (%)	54 (67.5)	40 (65.6)	31 (60.8)	119 (65.7)	6 (54.5)	14 (56)	111 (66.5)
P-value	0.731			0.449		0.306	
<i>Influenza during pregnancy is associated with an increased risk of fetal complications</i>							
Agree, N (%)	48 (60)	36 (59)	24 (47.1)	104 (57.5)	4 (36.4)	13 (52)	95 (56.9)
P-value	0.302			0.171		0.646	
<i>Vaccination is an important preventative measure in reducing complications</i>							
Agree, N (%)	72 (90)	57 (93.4)	49 (96.1)	170 (93.9)	8 (72.7)	24 (96)	154 (92.2)
P-value	0.412			0.009		0.497	
<i>Influenza vaccination is considered safe in pregnancy</i>							
Agree, N(%)	72 (90)	54 (88.5)	47 (92.2)	167 (92.3)	6 (54.5)	23 (92)	150 (89.8)
P-value	0.814			0.001		0.734	
<i>Influenza consequences prevented by vaccination during pregnancy</i>							
Increased maternal hospitalization	78 (97.5)	57 (93.4)	45 (88.2)	169 (93.4)	11 (100)	24 (96)	156 (93.4)
P-value	0.101			0.378		0.618	
Increased maternal ICU admissions	77 (96.3)	52 (85.2)	42 (82.4)	161 (89)	10 (90.9)	23 (92)	148 (88.6)
P-value	0.023			0.840		0.614	

Maternal death	72 (90)	47 (77)	43 (84.3)	154 (85.1)	8 (72.7)	22 (88)	140 (83.8)
P-value	0.111			0.273		0.592	
Preterm delivery	70 (87.5)	50 (82)	43 (84.3)	153 (84.5)	10 (90.9)	21 (84)	142 (85)
P-value	0.656			0.566		0.893	
Miscarriage	68 (85)	42 (68.9)	43 (84.3)	145 (80.1)	8 (72.7)	23 (92)	130 (77.8)
P-value	0.039			0.555		0.101	
Fetal death	67 (83.8)	44 (72.1)	41 (80.4)	145 (80.1)	7 (63.6)	20 (80)	132 (79)
P-value	0.235			0.191		0.912	
<i>Influenza vaccination is recommended for all pregnant women during the flu season</i>							
Yes, N(%)	75 (93.8)	51 (83.6)	43 (84.3)	162 (89.5)	7 (63.6)	23 (92)	146 (87.4)
P-value	0.118			0.010		0.511	
<i>Influenza vaccination is recommended for only pregnant women with other co-morbidities during flu season</i>							
Yes, N (%)	8 (10)	7 (11.5)	13 (25.5)	26 (14.4)	2 (18.2)	4 (16)	24 (14.4)
P-value	0.035			0.728		0.830	
<i>Influenza vaccine is recommended in all trimesters</i>							
Yes, N(%)	67 (83.8)	48 (78.7)	37 (72.5)	148 (81.8)	4 (36.4)	22 (88)	130 (77.8)
P-value	0.304			0.001		0.244	

Relationship between demographic characteristics and attitude of physicians

Table 5 shows the relationship between physicians' demographics and their attitudes towards influenza vaccination in pregnant women. Physicians' attitudes toward discussing and offering vaccination during flu season in pregnant women significantly differed between FPs and GPs (P = 0.017 and P = 0.001, respectively) and in relationship to the number of years in practice (P=0.021 and P=0.043, respectively). Physicians with less than 10 years of experience and FPs were more likely to discuss the influenza vaccine and offer it to all pregnant women. Physicians' responses regarding discussing and offering vaccination only to high-risk pregnant women during flu season and their beliefs about vaccination safety did not significantly correlate with any demographic parameters.

FPs placed greater emphasis on positive doctor-patient relationships and recommendations from the patients' obstetrician than those GPs. (P = 0.001 for both factors). Neither of the other factors showed a significant association with the demographic parameters of physicians.

A significant association was not found between physicians' experience, title, or sex, whether they had taken the influenza vaccine within the past

year, intended to do so, or their views regarding the vaccination of healthcare workers against influenza. Additionally, FPs were more likely to recommend the influenza vaccine to pregnant women than GPs, 93.9% vs. 72.7%, P = 0.009 during the flu season.

The safety for pregnant women was more frequently cited by GPs than FPs as a reason for not recommending the influenza vaccine to pregnant women (27.3% vs. 3.3%), and the difference was statistically significant (P = 0.001). Physicians with more than 20 years of experience were more likely (11.8%) to express concern about the fetus' safety than younger physicians, a difference which was also statistically significant (P = 0.017). The demographic characteristics of physicians were not related to not offering the influenza vaccine because of its ineffectiveness during pregnancy, lack of knowledge, or refusal by mothers.

There was a significant relationship between the respondents' demographic characteristics and their use of the local guidelines as a source of information about influenza vaccination during pregnancy. The local guidelines were referred to more often by younger physicians (68.8%), FPs (63%), and females (64.7%). The differences noted among the groups were statistically significant (P = 0.044, P = 0.018, and P = 0.006, respectively). A significant

correlation was not found between the other sources of information and demographic characteristics.

Despite the lack of statistical significance, male physicians prefer that pregnant women receive

influenza vaccinations in either hospitals or PHCs (56%), whereas female physicians prefer to vaccinate pregnant women in PHCs (66.5%) P = 0.05.

Table 5: Relationship between demographic characteristics and attitude of physicians

	Number of years in practice			Professional Title		Sex	
	<10	10 - 19	≥20	Family physician	General physician	Male	Female
	n=80	n=61	n=51	n=181	n=11	n=25	n=167
<i>It is my responsibility to discuss vaccination with all pregnant women during the flu season</i>							
Agree, N(%)	78 (97.5)	55 (90.2)	51 (100)	175 (96.7)	9 (81.8)	25 (100)	159 (95.2)
P-value	0.021			0.017		0.264	
<i>It is my responsibility to offer vaccination with all pregnant women during the flu season</i>							
Agree, N(%)	78 (97.5)	54 (88.5)	44 (86.3)	169 (93.4)	7 (63.6)	21 (84)	155 (92.8)
P-value	0.043			0.001		0.137	
<i>It is my responsibility to discuss vaccination with only high-risk pregnant women during the flu season</i>							
Agree, N(%)	24 (30)	23 (37.7)	21 (41.2)	64 (35.4)	4 (36.4)	8 (32)	60 (35.9)
P-value	0.386			0.946		0.702	
<i>It is my responsibility to offer vaccination to only high-risk pregnant women during the flu season</i>							
Agree, N(%)	25 (31.3)	17 (27.9)	23 (45.1)	61 (33.7)	4 (36.4)	8 (32)	57 (34.1)
P-value	0.129			0.856		0.834	
<i>I feel confident recommending influenza vaccination, as I believe it to be safe during pregnancy</i>							
Agree, N(%)	77 (96.3)	53 (86.9)	46 (90.2)	167 (92.3)	9 (81.8)	23 (92)	153 (91.6)
P-value	0.124			0.224		0.948	
<i>I believe factors that encourage pregnant women to receive vaccination include</i>							
Strong doctor-patient relationship	79 (98.8)	61 (100)	49 (96.1)	180 (99.4)	9 (81.8)	24 (96)	165 (98.8)
P-value	0.239			0.001		0.292	
Recommendations from patients GP	77 (96.3)	54 (88.5)	44 (86.3)	166 (91.7)	9 (81.8)	22 (88)	153 (91.6)
P-value	0.100			0.262		0.553	
Recommendations from patient's obstetrician	80 (100)	61 (100)	50 (98)	181 (100)	10 (90.9)	25 (100)	166 (99.4)
P-value	0.249			0.001		0.698	
Patients risk factors for disease	79 (98.8)	59 (96.7)	50 (98)	177 (97.8)	11 (100)	24 (96)	164 (98.2)
P-value	0.704			0.618		0.472	
Health professional having sufficient time to counsel patients on vaccination	77 (96.3)	60 (98.4)	50 (98)	176 (97.2)	11 (100)	24 (96)	163 (97.6)
P-value	0.697			0.576		0.638	
<i>As a healthcare provider, have you received the influenza vaccine in the past 12 months</i>							
Yes, N(%)	42 (52.5)	43 (70.5)	34 (66.7)	112 (61.9)	7 (63.6)	18 (72)	101 (60.5)
P-value	0.067			0.907		0.268	

<i>If no, do you intend on taking the influenza vaccine?</i>							
Yes, N(%)	27 (71.1)	11 (61.1)	14 (87.5)	50 (73.5)	2 (50)	6 (85.7)	46 (70.8)
P-value	0.224			0.307		0.402	
<i>Do you believe that all healthcare providers should be immunized against influenza?</i>							
Yes, N(%)	76 (95)	57 (93.4)	49 (96.1)	171 (94.5)	11 (100)	24 (96)	158 (94.6)
P-value	0.818			0.423		0.771	
<i>As a healthcare provider, do you recommend influenza vaccination to pregnant women during flu season</i>							
Yes, N(%)	76 (95)	54 (88.5)	48 (94.1)	170 (93.9)	8 (72.7)	24 (96)	154 (92.2)
P-value	0.309			0.009		0.497	
<i>Reasons for not recommending influenza vaccine for pregnant patients</i>							
Fear of safety on mother	3 (3.8)	2 (3.3)	4 (7.8)	6 (3.3)	3 (27.3)	1 (4)	8 (4.8)
P-value	0.457			<0.001		0.862	
Fear of safety on foetus	1 (1.3)	2 (3.3)	6 (11.8)	8 (4.4)	1 (9.1)	1 (4)	8 (4.8)
P-value	0.017			0.477		0.862	
Lack of knowledge	1 (1.3)	4 (6.6)	2 (3.9)	6 (3.3)	1 (9.1)	2 (8)	5 (3)
P-value	0.248			0.321		0.213	
Mother refusal	6 (7.5)	2 (3.3)	2 (3.9)	10 (5.5)	0 (0)	1 (4)	9 (5.4)
P-value	0.477			0.423		0.771	
Lack of effectiveness of this vaccine	1 (1.3)	1 (1.6)	1 (2)	3 (1.7)	0 (0)	1 (4)	2 (1.2)
P-value	0.949			0.667		0.292	
Other	1 (1.3)	3 (4.9)	0 (0)	4 (2.2)	0 (0)	1 (4)	3 (1.8)
P-value	0.153			0.618		0.472	
<i>Source of information</i>							
Discussion with colleagues	41 (51.2)	29 (47.5)	20 (39.2)	86 (47.5)	4 (36.4)	11 (44)	79 (47.3)
P-value	0.401			0.472		0.757	
Past experience	32 (40)	21 (34.4)	21 (41.2)	71 (39.2)	3 (27.3)	14 (56)	60 (35.9)
P-value	0.720			0.429		0.054	
Medical literature	58 (72.5)	48 (78.7)	37 (72.5)	134 (74)	9 (81.8)	20 (80)	123 (73.7)
P-value	0.659			0.565		0.497	
Attendance at continuing education/ CME	47 (58.8)	40 (65.6)	27 (52.9)	110 (60.8)	4 (36.4)	11 (44)	103 (61.7)
P-value	0.395			0.109		0.093	
Presence of local guideline	55 (68.8)	38 (62.3)	24 (47.1)	114 (63)	3 (27.3)	9 (36)	108 (64.7)
P-value	0.044			0.018		0.006	
<i>In your view, where should pregnant women be given influenza vaccine?</i>							
Hospital	1 (1.3)	1 (1.6)	1 (2)	2 (1.1)	1 (9.1)	0 (0)	3 (1.8)
Health centre	51 (63.7)	42 (68.9)	29 (56.9)	115 (63.5)	7 (63.6)	11 (44)	111 (66.5)
Either	28 (35)	18 (29.5)	21 (41.2)	64 (35.4)	3 (27.3)	14 (56)	53 (31.7)
P-value	0.769			0.109		0.054	

Discussion

This survey included 192 physicians providing care for pregnant women and found that 92.7% of physicians in Bahrain recommended influenza vaccination to pregnant women in flu season, and the majority believed it was their responsibility to advise pregnant women about vaccination. Overall, the findings of our study suggest that PCPs in Bahrain have a high level of knowledge (80%-90%) about antenatal vaccination safety and effectiveness in reducing fetal and maternal complications. In addition, nearly two-thirds of respondents acknowledged that influenza during pregnancy could lead to complications.

This good knowledge and favorable attitude toward PCPs in Bahrain can be attributed to the fact that influenza vaccination guidelines and periodic circulars have been published locally. Moreover, PCPs are regularly reminded of these guidelines and circulars by emailing them and inviting physicians to attend workshops and seminars whenever new guidelines are launched.

Although both FPs and GPs demonstrated good knowledge about the influenza vaccine in pregnancy, vaccination safety and effectiveness in reducing complications were more accepted by FPs than GPs. Additionally, FPs agreed to offer the vaccine to all pregnant women regardless of their co-morbidities and in all trimesters, more than GPs. This learning gap can partly be explained by the fact that FPs undergo more intensive training than GPs, constantly evaluate their performance by supervisory consultants, and are board-certified.

According to a survey conducted in Mexico in 2020, family physicians lacked knowledge about influenza morbidity and mortality during pregnancy, as well as the importance of flu vaccination for pregnant women.¹⁷ The study showed that around 46.1 % of the family physicians believed that vaccination protection extends only to the mother but not the fetus.¹⁷ Whereas in our study, PCPs had more knowledge regarding the effectiveness of the influenza vaccination in reducing morbidity and mortality to mother and fetus and preventing complications (92.7%).

A similar study was conducted in 2019 involving Thai physicians, wherein it was found that physicians were more likely to prescribe vaccination routinely when they had greater than 3 years of experience, had previously treated pregnant women for influenza, and were aware of their Ministry of Public Health's (MOPH) recommendations regarding the influenza vaccination in pregnancy.¹⁶ In our study, those with less than 10 years of experience were more likely to recommend the influenza vaccination to pregnant women. This may be attributed to their referral to the local guidelines more often than those with more experience, reflected in their belief that the influenza vaccine can reduce ICU admissions and miscarriages in pregnancy.

Furthermore, physicians with more experience are more likely to recommend against influenza vaccinations for pregnant women due to concerns about fetus safety.

A study by Healy et al (2015) demonstrated that 60 of 63 providers (95.2%) had no qualms about giving vaccines during pregnancy. A severe allergic reaction or anaphylactic reaction and knowledge of live viral vaccines being contraindicated were identified as contraindications to immunizations.¹⁹ The barriers evaluated in our study were lack of knowledge, fear of injury to the mother or fetus, mother refusal, and ineffectiveness of the vaccine, none of which were contraindications or reasons not to give the vaccine.

The studies by Wilcox 18 and Mohammed 20 showed that recommendations from the obstetrician, GP, or FP involved with prenatal care had a greater influence on vaccination compliance and uptake than those without such recommendations. This is in congruence with our present study, where it was found that not only recommendations from the FP, GP, or OBG specialist but also strong patient-doctor relationships and counseling can encourage pregnant women to take up immunization without hesitancy surrounding it.

The FPs, in contrast to GPs, placed a higher emphasis on the effect of a strong doctor-patient relationship on encouraging pregnant women to take the vaccine. This could be attributed to their

in-depth communication skills training during their residency program.

Another issue studied was the compliance and intention of the physicians themselves to take vaccination annually. A survey of acceptance of the influenza vaccine amongst health workers by De Souza et al in 2019, showed that Influenza vaccine coverage was 61.5%, but was found higher among nurses (69.0%) than physicians (49.1%)²¹, which was like our study (61.9%).

In Bahrain, a survey was conducted in 2020 to determine the uptake and attitudes toward influenza vaccines by PCPs.²² The results revealed that 53.4% of physicians were vaccinated. The most reported barriers to vaccination were, preferring to use barrier protection such as masks (47.4%), fear of the injection (37.6%), and fear of the side effects of the vaccine (34.6%).

Strengths and limitations

Strengths of this study include the national target population, including all the PCPs working in all PHCs in Bahrain with an overrepresentation of female doctors.

Despite frequent reminders, we achieved a relatively low response rate (55%), resulting in a small sample size. This may limit our ability to generalize our findings to this population.

Recommendations

More efforts should be spent on spreading awareness among PCPs about influenza vaccines in pregnancy, with a particular focus on GPs. This could lead to favorable attitudes and knowledge changes, ultimately reducing influenza-related morbidity and mortality. We also believe that the flu vaccination circular should be emphasized in antenatal clinics.

Educational opportunities and continuing medical education sessions should be provided to PCPs where vaccination safety and protective efficacy are emphasized. Moreover, more awareness campaigns regarding this subject would be very helpful. Real-life cases highlighting the consequences of the disease in those not vaccinated must be showcased.^{23,24}

It is also essential to educate the physicians and encourage them to get vaccinated as per the schedule.

Moreover, it would be helpful to conduct additional studies in Bahrain to investigate the uptake rate of influenza vaccines in pregnancy and the attitudes of pregnant women toward them. This is of great importance based on the results of the study conducted in Bahrain, which stated that 78.9% of pregnant primary care physicians during the studied period did not receive the influenza vaccine during their pregnancies.²²

Conclusion

Our study showed that healthcare workers believe that influenza vaccination is not limited to high risk pregnancies. In addition, the vaccine's safety has been accepted, as well as the fact that many fears or barriers are unfounded and can be circumvented by good counseling. Physicians also trusted that pregnant women were more willing to accept vaccination if their FPs, obstetricians, or GPs advised and spent time counseling them. The positive attitude of the physicians toward influenza vaccination in general and among pregnant women was also found to be promising. We have concluded that the influenza vaccination is widely recommended by the majority of the PCPs practicing in the local health centers across Bahrain and that they are well-versed in its indications and importance.

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