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Noman Ahmed Yahya Al Hatemi

Haddad Salim Alhebshi

Abdulkader Naser Hassan Alhaj

Thiyazan Hasshem Al-Bukhaiti

Rashed Ali AlZrarraei

See next page for additional authors

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Noman Ahmed Yahya Al Hatemi, Haddad Salim Alhebshi, Abdulkader Naser Hassan Alhaj, Thiyazan Hasshem Al-Bukhaiti, Rashed Ali AlZrarraei, Arafat Mohammed Ahmed Khaled, Ammar Yasser Alhaliani, and Salwa Abdullah Hamid Baalawi

ORIGINAL STUDY

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Exploring Mothers' Attitudes and Practices Toward Childhood and Maternal Vaccination at Jiblah University Hospital, Ibb, Yemen, 2024: A Cross-Sectional Study

Noman Ahmed Yahya Al Hatemi [a,*], Haddad Salim Alhebshi [b], Abdulkader Naser Hassan Alhaj [c], Thiyazan Hasshem Al-Bukhaiti [c], Rashed Ali AlZrarraei [c], Arafat Mohammed Ahmed Khaled [c], Ammar Yasser Alhaliani [c], Salwa Abdullah Hamid Baalawi [c]

[a] Department of Community Health Nursing, Dean of Faculty Nursing, Jibla University for Medicine and Health Sciences, Ibb, Yemen
[b] Department of Community Health Nursing, College of Nursing, Hadhramaut University, Mukalla, Yemen
[c] Undergraduate of the Faculty of Nursing, Jiblah University for Medical and Health Sciences, Ibb Governorate, Yemen

Abstract

Several factors contribute to insufficient vaccination, including lack of awareness of its importance and issues related to both demand and supply. This study aimed to assess mothers' attitudes and practices toward child and maternal vaccination, as well as the association of potential risk factors.

Method: A descriptive cross-sectional study was conducted between January 20 and July 31, 2024, at Jiblah University Hospital.

Results: A total of 300 mothers participated in the study. Of these, 38% were aged between 16–25 years, 60.7% had 2–3 children, and 13.3% were literate. The attitude score among mothers was 92% (275 out of 300), and the practice score was 93% (280). There was a significant association between residence, monthly family income, and total score of mothers' practices toward child vaccination, with p-values of 0.014 and 0.005, respectively. However, no significant association was found between mothers' attitudes toward child and maternal vaccination and their socio-demographic factors ($p > 0.05$).

Conclusion: Despite a highly positive attitude and good practices toward children's vaccination, there were gaps in attitudes and practices concerning maternal vaccination. Mothers demonstrated limited awareness of the susceptibility of pregnant women to diseases like influenza, tetanus, and whooping cough.

Keywords: Attitude, Practice, Mothers, Children, Pregnancy, Vaccination, Yemen

1. Introduction

Child survival rates have significantly improved, leading to an increase in life expectancy over the last century [1]. In recent decades, childhood vaccination has become widespread as a key strategy to protect vulnerable populations from diseases [2]. Globally, vaccines have prevented millions of deaths from vaccine-preventable diseases (VPDs) through immunization efforts [3]. Approximately 84% of the global population received coverage for the third dose of the diphtheria, tetanus, and pertussis (DTP3) vaccine [4]. Insufficient vaccination coverage is influenced by various factors, including a lack of

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* Corresponding author.
E-mail addresses: nalhatemi2019@gmail.com (N. A. Y. Al Hatemi), h.alhabshi@hu.edu.ye (H. S. Alhebshi), abdulkaderalhaj28@gmail.com (A. N. H. Alhaj), thiyazanalbukhaiti@gmail.com (T. H. Al-Bukhaiti), rashadalzoray@gmail.com (R. A. AlZrarraei), Arfatmalqhtany@gmail.com (A. M. A. Khaled), alhaliany.amar@gmail.com (A. Y. Alhaliani), salwabaalwey20@gmail.com (S. A. H. Baalawi).

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awareness about the importance of vaccination, as well as demand- and supply-side determinants [5]. Additionally, in developing countries, limited access to vaccines, low levels of education, socioeconomic challenges, and family-related factors have negatively impacted the vaccination process [6]. The weakness or collapse of the healthcare system, along with a lack of acceptance of healthcare services, are major barriers to the vaccination process and vaccine utilization [7]. Despite the availability of vaccines, the phenomenon of vaccine hesitancy is evident in the low vaccination coverage among children [8].

In other words, delaying or refusing vaccines has become a problem affecting both high-income and developing countries in recent years [9, 10]. Similarly, two studies conducted in the United Arab Emirates (2020) and Yemen (2022) indicated that vaccine hesitancy among parents is a significant issue that impacts vaccination uptake [11–13]. In Yemen, low income, a weak health system, limited economic resources, and a challenging geographic environment pose significant barriers to immunization [14]. Since March 2015, the civil war, internal displacement, and shortages of essential services have severely limited vaccination coverage in Yemen (15). In 1979, the Expanded Program on Immunization (EPI) was launched as part of primary health care services in public health facilities, supported by the Ministry of Public Health and Population in Yemen. The program aimed to reduce morbidity and mortality among infants and women of childbearing age [16]. The routine immunization program in Yemen extended to health facilities, providing vaccines to target groups. In 2018, DTP3 vaccination coverage reached 65% across the country, and by 2020, it had fallen below 90% (17).

This study was aimed at assessing mothers' attitudes and practices regarding vaccination for children and pregnant women, and evaluating the association between certain sociodemographic factors of mothers and their attitudes and practices toward vaccination for children and pregnant women.

2. Materials and methods

2.1. Study design

A descriptive cross-sectional study was conducted from January 20 to July 31, 2024.

2.2. Sample and setting

A quota sample of 300 mothers with children under five years old was selected during their routine visits to the primary healthcare room for child or maternal vaccinations at Jiblah University Hospital, Ibb-Yemen. Mothers who refused to participate, were newly married, or pregnant for the first time were excluded from the study. Individual interviews were conducted with each mother in a private room to ensure confidentiality and comfort. All participating mothers were informed that they could withdraw or stop the interview at any time during the study.

2.3. Study instrument

A pre-tested questionnaire was utilized to gather information from the mothers. The questionnaire was divided into three sections:

1. Socio-Demographic Characteristics: This section includes age, number of children, education level, employment status, and family income.
2. Mothers' Attitudes Towards Child and Pregnant Women Vaccines: This section consists of 11 statements assessing attitudes.
3. Mothers' Practices Towards Child and Pregnant Women Vaccines: This section includes 4 statements regarding practices.

The total scores were calculated based on mothers' responses. The attitude scores ranged from 0 to 11, with scores below 50% indicating a negative attitude and scores above 50% indicating a positive attitude towards child and maternal vaccination. The main categories of the attitude scale included trust in vaccination locations, perceived benefits and safety of vaccination, encouraging others to vaccinate their children, the importance of vaccines for pregnant women, and awareness of communicable diseases affecting pregnant women.

The practice scores ranged from 0 to 4, with scores below 50% indicating poor practice regarding child and maternal vaccination, while scores above 50% represented good practice (Supplementary File).

2.4. Reliability and validity

A reliability test was conducted using the questionnaire with 15 mothers. A pretest was carried out to assess the mothers' responses and ensure the suitability of the questions. The questionnaire was then re-administered to the same group of mothers, yielding a reliability score of 0.79.

2.5. Statistical analysis

Data analysis was performed using SPSS software version 26. Descriptive statistics, including frequency and percentages, were employed for categorical variables. The mean and standard deviation

Table 1. Distribution of socio-demographic characteristics of mothers at Jiblah University Hospital, Ibb, Yemen 2024, (n = 300).

Variables	Categories	Frequency	Percentage (%)
Age of Mother	20 to 25	114	38%
	26 to 35	108	36%
	36 to 45	60	20%
	46+	18	6%
	Mean±SD of age = 30.4±8.7		
Number of Children (age >5 years)	One	63	21%
	2 to 3	182	60.7%
	4–5	55	18.3%
Marital Status	Married	279	93%
	Divorced	11	3.7%
	Widow	10	3.3%
Education Level	Literate	40	13.3%
	Primary school	110	36.7%
	secondary school	107	35.7%
	University	43	14.3%
Work	Yes	40	13.3%
	No	260	86.7%
Family's Income (monthly)	50000–70000 YER	56	18.7%
	71000–100000 YER	187	62.3%
	Over 101000 YER	57	19%

were used to describe various characteristics. The Chi-Square test was utilized to examine the significant relationship between socio-demographic variables and attitude and practice scores among the mothers in the sample. Additionally, the Pearson correlation coefficient was applied to assess the relationship between mothers' attitude scores and practice scores. A p-value of less than 0.05 was considered indicative of statistical significance.

2.6. Ethical considerations

Ethical approval was granted by the ethical committee at Jiblah University for Medical and Health Sciences in Yemen. The participating mothers were informed that their participation was voluntary and that they had the right to withdraw at any time during the data collection process. Prior to individual interviews, verbal consent was obtained from all mothers involved in the study. Thus, ethical approval was formally issued by the ethics board of Jiblah University (Reference No: Nurs.2.2024.6).

3. Results

3.1. Mothers' socio-demographic

The study included a total of 300 mothers, with a mean age of 30.4 years (SD = 8.7 years). Approximately 60.7% of the mothers had 2–3 children, while 21% had one child and 18.3% had 4–5 children. More than one-third of the mothers held primary and secondary school certificates (36.7% and 35.7%, respectively), compared to 13.3% who were literate. Additionally, over 62.3% of the mothers reported a monthly family income of 71,000–100,000 Yemeni Rial (YER), with only 19% earning over 101,000 YER. These findings are presented in Table 1 below. In terms of residence, 59% of the mothers lived in urban areas, while 41% resided in rural areas (Fig. 1).

3.2. Mothers' attitudes and practices toward vaccination

In this study, Fig. 2 below visualizes the total score of mothers' attitudes toward vaccination of children and pregnant women. It was cleared that majority of mothers have positive attitude (n = 276, 92%) toward vaccination. The relative items of attitude were collected with frequency and percentages. Table 2 below shows the distribution of mothers' attitudes regarding children and pregnant women vaccination. It is clear that the majority of mothers (93%) had positive attitude toward trust vaccination places as health facilities, and only around three quarters (74%) of them had a positive attitude to able to discuss the type of vaccine given to their children with health center staff. Moreover, high positive attitude of mothers (98%) thinks that vaccinations are beneficial for their children, 96% feel that vaccines are safe for their children and 97.3% advise their family and relatives to vaccinate their children. Conversely, only 64.7% of mothers support the compulsory vaccination programs designed by the Ministry of Health. Regarding the vaccine of pregnant women, most of participant mothers have positive attitude, they say that a vaccine can be given during pregnancy, and important for

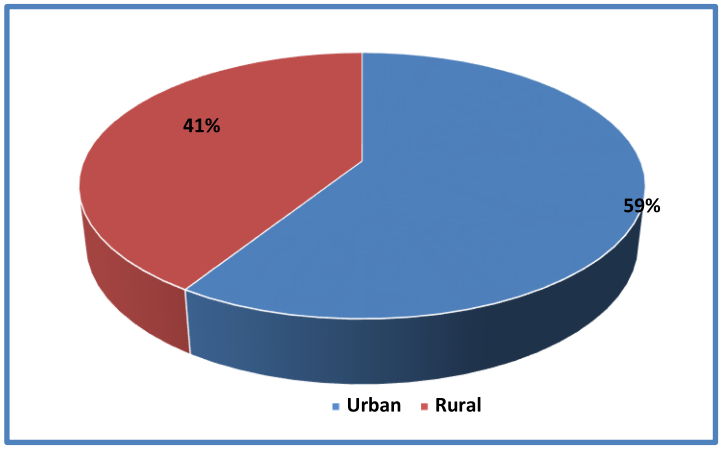

Fig. 1. Percentage of Participants by Residence Who Attended Jiblah University Hospital, Ibb, Yemen, 2024 (n = 300).

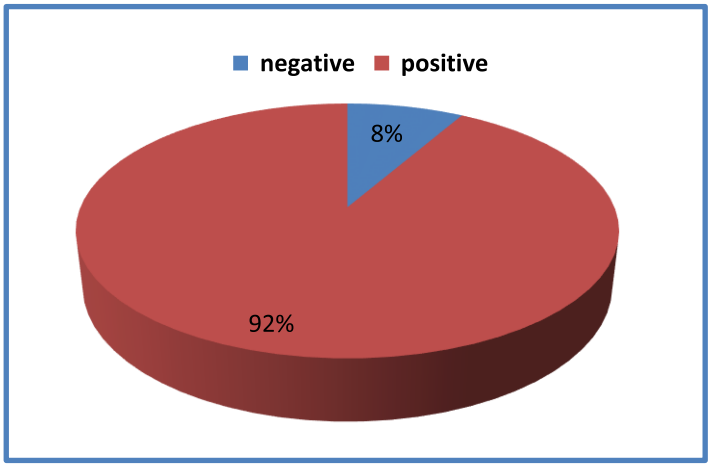

Fig. 2. Overall Score of Mothers' Attitudes Toward Vaccination at Jiblah University Hospital, Ibb, Yemen 2024 (n = 300).

pregnant woman (77% and 74% respectively). Finally, Table 2 revealed that most of the mothers (76.3%) believed that pregnant mother is more susceptible to catch influenza. While around half of the mothers believed that a pregnant mother is more susceptible to tetanus and whooping cough (59.3% and 53.3% respectively).

Fig. 3, presents the total score of mothers' practices toward vaccination of children and pregnant women. It is shown that the majority of mothers have good practice (n = 279, 93%) toward vaccination. The relative items of practices were collected with frequency and percentages. Table 3 above shows the distribution of mothers' practice regarding children vaccination. Majority of mothers have good practice (97%) to use pain relievers to lower swelling and pain after vaccinating a child, and 90% of them follow the compulsory vaccination programs listed in the vaccination schedule. Conversely, only 60% of mothers have practice to receive vaccines during pregnancy, and few of them (11%) look for other vaccines available to children see Table 3.

3.3. Vaccination attitudes and practices by mothers' characteristics

Table 4 shows the association between the total score of mothers' Attitudes and their Sociodemographic Characteristics regarding vaccination.

3.4. Age of mothers and children

Regarding mothers' age, no significant differences are noted in the statements ($p > 0.05$). But majority of mothers at all age groups have positive attitude toward child vaccination and pregnant mother vaccination during the pregnancy. The positive attitude is gradually advancing according to mothers' ages; 94.4% represents 46-year-old mothers and above, 93.3% of mothers whose ages range from 36 to 45,

Table 2. Distribution of mothers' attitudes toward child and pregnant women vaccination at Jiblah University Hospital, Ibb, Yemen, 2024 (n = 300).

No.	Mothers' Attitude	Frequency	Percentage (%)
1	Do you trust health facilities as vaccination locations?	279	93%
2	Are you able to discuss the type of vaccine administered to your child with the staff at the vaccination center?	222	74%
3	Do you believe that vaccinations are beneficial?	294	98%
4	Do you believe it is safe for your child to receive vaccinations?	288	96%
5	Do you endorse the mandatory vaccination programs implemented by the Ministry of Health?	194	64.7%
6	Do you recommend that your family and relatives vaccinate their children?	292	97.3%
7	Is it safe to administer certain vaccines during pregnancy?	231	77%
8	In your view, how important is vaccination during pregnancy?	222	74%
9	Is a pregnant woman more vulnerable to whooping cough?	160	53.3%
10	Is a pregnant woman more susceptible to contracting influenza?	229	76.3%
11	Is a pregnant woman more susceptible to tetanus?	178	59.3%

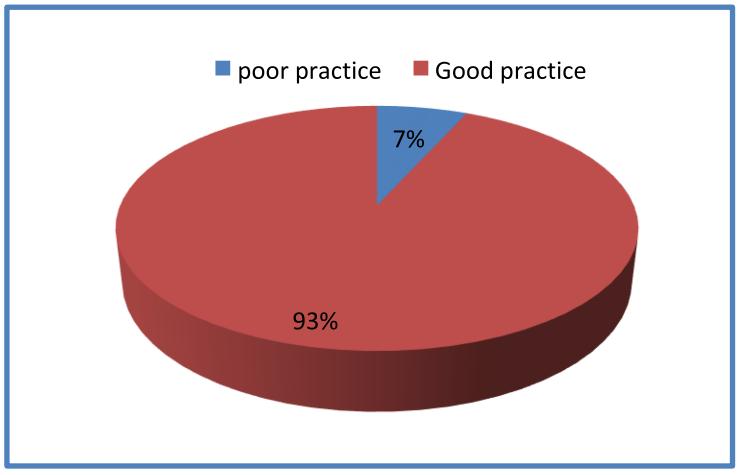

Fig. 3. Total Score of Mothers' Practice Toward Vaccination at Jiblah University Hospital, Ibb, Yemen 2024 (n = 300).

Table 3. Distribution of mothers' practices concerning children's and maternal vaccination at Jiblah University Hospital, Ibb, Yemen 2024 (n = 300).

No.	Participant's Practice	Frequency	Percentage (%)
1	Do you administer pain relievers to alleviate swelling and discomfort after your child receives vaccinations?	291	97%
2	Do you adhere to the compulsory vaccination programs outlined in the vaccination schedule?	270	90%
3	Do you seek out additional vaccines that are available for your child?	33	11%
4	Did you receive any vaccines during your pregnancy?	180	60%

92.6% is the percentage of mothers aged from 26 to 35 years, and 89.5% of them who are at ages 16 to 25. Concerning the number of children, no significant differences are noted in the statements ($p > 0.05$). But the majority of mothers who have one child 96.8% have a positive attitude. Followed up by 90.9% of mothers who have 4–5 children, and 90.1% of them have 2–3 children.

Regarding mothers' attitudes based on their residence and education level, a majority display a positive outlook toward child vaccination and vaccinations for pregnant women. This positivity is notably higher among mothers from rural areas (95.1%) compared to those in urban areas (89.3%). Additionally, mothers with a university education and those with primary school certificates show higher positive attitudes (97.7% and 93.6%, respectively) than mothers with other educational backgrounds.

Regarding the overall practice scores, Table 4 indicates a significant difference based on monthly family income, residence, and the total score of mothers' practices toward child vaccination. Notably, 96.3% of mothers with a monthly family income of 71,000–101,000 Yemeni Rial (YER) demonstrated good practices related to child and maternal vaccination, in contrast to 83.9% of those with an income of 101,000 YER

Table 4. Relationship between mothers' total attitude scores and their socio-demographic characteristics concerning vaccination at Jiblah University Hospital, Ibb, Yemen 2024 (n = 300).

	Attitude		Statistic	
Variables	Negative (25) NO. (%)	Positive (275) NO. (%)	Chi squire	P-value
Age				
16 to 25	12(10.5%)	102(89.5%)	1.239	.744
26 to 35	8(7.4%)	100(92.6%)		
36 to 45	4(6.7%)	56(93.3%)		
Over 46	1(5.6%)	17 (94.4%)		
Mother's Children Number (age >5 years)				
One	2(18.2%)	61(96.8%)	2.814	.245
2 to 3	18(9.9%)	164(90.1%)		
4–5	5(9.1%)	50(90.9%)		
Resident				
Urban	19(10.7%)	158(89.3%)	3.258	0.071
Rural	6(4.9%)	117(95.1%)		
Marital Status				
Married	23(8.2%)	256(91.8%)	2.309	0.315
Divorced	2(18.2%)	9(81.8%)		
Widow	0(0%)	10(100%)		
Level of Education				
Literate	5(12.5%)	35(87.5%)	4.663	.198
Primary school	7(6.4%)	103(93.6)		
Secondary	12(11.2%)	95(88.8%)		
University	1(2.3%)	42(97.7%)		
Work				
Yes	3(7.5%)	37(92.5%)	0.042	0.838
No	22(8.5%)	238(91.5%)		
Family's income (Pre-month)				
50000–70000 R.Y	6(10.5%)	51(89.5%)	4.427	0.109
71000–100000 R.Y	11(5.9%)	176(94.1%)		
1010000 and more	8(14.3%)	48(85.7%)		

or more (p = 0.005). Additionally, 97.8% of mothers in rural areas exhibited good practices, compared to 90.4% in urban areas (p = 0.014).

4. Discussion

At present, vaccination is not a mandatory program in Yemen [18–20]. Despite the ongoing local war and conflicts between factions since 2015, health offices in various directorates and governorates, along with international and local organizations, continue to make significant efforts to provide vaccines to the targeted groups of women and children [21]. The present study aims to evaluate mothers' attitudes and practices regarding the immunization of children under five years old and pregnant women at Jiblah University Hospital in Ibb, Yemen. A previous study conducted in Al-Mukalla, Yemen, found that all parents (100%) exhibited a positive attitude toward childhood immunization [22]. In the current study, a significant majority of mothers (92%) demonstrated positive attitudes toward the vaccination of both children and pregnant women. This disparity between the two studies may be attributed to the fact that the present research specifically involved mothers. Furthermore, the positive attitudes of mothers regarding the vaccination of pregnant women were corroborated by another study conducted in South Africa [23]. Additionally, a global study aimed at evaluating public opinions on health and medical topics, including trust and attitudes toward vaccines, found that only one-quarter of respondents worldwide expressed trust in the vaccines provided by their local government [24].

Despite the challenges posed by the weak health system in Yemen amid the ongoing conflict, the current study found that a significant majority of mothers (93%) still trust that their children will receive vaccinations at healthcare facilities. Furthermore, the study revealed that 98% of mothers believe vaccinations are beneficial, and 96% consider vaccines safe for their children, while 97.3% encourage their family and relatives to vaccinate their children. These findings indicate a strong positive attitude toward vaccination. These results are consistent with another study

Table 5. Relationship between mothers' total practice scores and their socio-demographic characteristics concerning vaccination at Jiblah University Hospital, Ibb, Yemen 2024 (n = 300).

	Practice		Statistic	
Variables	Poor Practice (20) No. (%)	Good Practice (280) No. (%)	Chi-squire	p-value
Age				
16 to 25	12(10.5%)	102(89.5%)	5.003	0.172
26 to 35	5(4.6%)	103(95.4%)		
36 to 45	3(57%)	57(95%)		
Over 46	0(0%)	18(100%)		
Children Number (age >5 years)				
One	3(4.8%)	60(95%)	0.805	0.669
2 to 3	14(7.7%)	168(92.3%)		
4–5	3(5.5%)	52(94.5%)		
Residence				
Urban	17(9.6%)	160(90.4%)	5.988	0.014*
Rural	3(2.4%)	120(97.8%)		
Marital Status				
Married	18(6.5%)	261(93.5%)	3.079	0.214
Divorced	2(18.2%)	9(81.8%)		
Widow	0(0%)	10(100%)		
Level of Education				
Literate	2(5%)	38(95%)	5.640	0.130
Primary School	4(3.6%)	106(96.4)		
Secondary School	12(11.2%)	95(88.8%)		
University School	2(4.7%)	41(95.3%)		
Work				
Yes	2(5%)	38(95%)	0.206	0.65
no	18(6.9%	242(93.1%)		
Family's income (per month)				
50000–70000 YER	4(7%)	53(93%)	10.54	0.005*
71000–100000 YER	7(3.7%)	180(96.3%)		
101000 YER and Over	9(16.1%)	47(83.9%)		

conducted in Saudi Arabia [25]. In contrast to a study conducted in Yemen [26], while a previous Yemeni study indicated that 100% of parents had a positive attitude toward vaccination programs, the current study shows a decline, with only 64.7% of mothers supporting compulsory vaccination programs. This disparity can be attributed to the fact that the current study was conducted ten years after the onset of internal conflict, which has significantly limited access to vaccination facilities for the population [27].

Regarding mothers' attitudes toward vaccinating pregnant women, approximately two-thirds (77%) indicated that they believe vaccines should be administered to pregnant mothers, while 74% stated that vaccination is important during pregnancy. These findings align with another international study [28]. Pregnant women are more vulnerable to communicable diseases. In this study, the mothers acknowledged that pregnant women are susceptible to such diseases; 76.3% identified influenza, 59.3% identified tetanus, and 53.3% identified whooping cough as particular concerns. These findings are consistent with another study [29]. Regarding the total attitude scores, no significant differences were found between the socio-demographic characteristics and the overall attitudes of mothers toward child vaccination and vaccinations for pregnant women. However, the majority of mothers across all age groups demonstrated a positive attitude toward both child vaccination and vaccinations during pregnancy. This finding aligns with another study [30]. With respect to the number of children, the majority of mothers across all groups exhibited a positive attitude. This finding is consistent with another study conducted in Saudi Arabia [25].

Concerning mothers' practices, the total score indicated that most mothers (93%) demonstrated good practices regarding the vaccination of children and pregnant mothers. This result aligns with findings from another study conducted in Ethiopia [31]. Additionally, the majority of mothers (97%) used pain relievers to alleviate swelling and discomfort following their child's vaccination. This finding is consistent with results from other studies [22, 30]. Many mothers demonstrated good practices in following

the compulsory vaccination programs outlined in the vaccination schedule. This finding aligns with a systematic review study [31]. Additionally, a study conducted in Italy in 2023 found that 70% of pregnant women believed vaccinations are safe during pregnancy, supported by strong evidence. Approximately 61% were aware of and recommended vaccination against influenza, while less than half (48.7%) recognized the risks associated with influenza during pregnancy. Furthermore, 74.1% of participants incorrectly reported information regarding the Measles-Mumps-Rubella (MMR) vaccine during pregnancy [32]. In Yemen, a study conducted in two hospitals in the capital, Sana'a, revealed that among 476 women, 87% received the tetanus vaccine, while the maternal vaccination rate was 33.6%. Additionally, 68.5% of the women were protected at the time of delivery [33]. In this study, 60% of mothers received vaccinations during pregnancy. The overall score of participants' practices indicates a significant difference based on monthly family income, residence, and the total score of mothers' practices regarding child vaccination and vaccination of pregnant mothers. These findings align with a systematic review conducted [34].

5. Conclusion

In this study, most mothers demonstrated a positive attitude and exhibited good practices regarding child vaccination and vaccination for pregnant women. Despite this generally positive outlook and practice, there remain notable weaknesses in areas such as vaccination for pregnant mothers and their susceptibility to influenza, tetanus, and whooping cough. Furthermore, there were low rates of mothers using vaccines during pregnancy.

Ethical approvals

Conflict of interest statement

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