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EXPLORING KNOWLEDGE, ATTITUDES, AND FACTORS AFFECTING THE UPTAKE OF PERTUSSIS VACCINE AMONG PREGNANT WOMEN IN THE SOUTH OF JORDAN

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Abstract: Understanding the dynamics of information, attitudes, and obstacles affecting pertussis vaccination adoption among pregnant women in Jordan is essential for enhancing mother and infant health outcomes. This cross-sectional study examined 300 pregnant women aged 18 to 45 who attended antenatal clinics at Prince Ali Bin Al-Hussein Military Hospital from October to November 2024. A standardized questionnaire evaluated demographics, knowledge on pertussis and its vaccine, attitudes toward vaccination, and influencing factors. Descriptive statistics and chi-square tests were utilized for analysis. The findings indicated that 146 (48.7%) of participants were aware of pertussis, while 151 (50.3%) recognized the vaccine's prescription during pregnancy. Only 89 individuals (29.7%) saw the vaccine as safe, while 111 (37%) were doubtful, and 100 (33.3%) considered it hazardous. The desire to vaccinate was notably affected by healthcare provider recommendations, with 110 (36.7%) indicating a favorable influence from robust expert counsel. Higher knowledge levels and positive attitudes were correlated with increased vaccine uptake. Women who relied on information from healthcare practitioners exhibited a higher likelihood of receiving vaccinations. The research underscores the influence of healthcare providers on vaccine choices. Despite information deficiencies and diverse perspectives, pregnant women in urban Jordan have shown receptiveness to immunization when sufficiently informed. Focused communication and educational initiatives highlighting vaccination safety and advantages, spearheaded by reputable healthcare professionals, are essential for enhancing vaccine acceptance and safeguarding maternal and newborn health.

Keywords: Pertussis vaccine, pregnant women, vaccine uptake, Jordan, maternal health.

Introduction

In urban Jordan, unlike in urban Egypt, the factors that affect the uptakes of pertussis vaccinations among pregnant women are a bit more complex and dynamic, besides several others. Generally, such knowledge is essential in improving vaccination rates for better health outcomes for mothers and infants. In general, the awareness level among pregnant women regarding risks associated with pertussis, compared with other vaccines like influenza, has had variations. Research has shown that many women regard pertussis as a more significant threat to their infants than it is to themselves, and this perception raises willingness to accept the pertussis vaccine during pregnancy [23]. This perception is essential since earlier research demonstrated the low knowledge concerning pertussis and its vaccine among pregnant women [15], [2]. In

Saudi Arabia, for example, there is a very worrying level of pertussis vaccination ignorance that is linearly associated with reduced uptakes, as in the case highlighted in the study by Alshahrani [2]. Therefore, Kilich et al. [14] highlighted that social and cognitive variables substantially influence vaccination decisions, introducing an additional aspect to the matter. The findings indicate that educational initiatives, such as those proposed by Ayouni et al. [4], may be essential for bridging knowledge gaps and enhancing acceptance among pregnant women.

Health-care providers are critical in influencing women's vaccination decisions during pregnancy. From their perspective, they showed attitude and knowledge of pertussis vaccination, which significantly affected their recommendations to their patients. Active discussion of vaccination, where HCPs show confidence in its safety and efficacy, would make them much more likely to observe better patient uptake rates [8], [24]. Engaging in active discussions on vaccination, during which healthcare professionals express confidence in its safety and efficacy, would significantly enhance patient uptake rates. Rane et al. [22] emphasized that utilizing surveillance data to discern sociodemographic characteristics can assist healthcare professionals in optimizing intervention targeting. Nonetheless, misunderstandings among pregnant women and healthcare professionals persist as substantial obstacles. According to Mohammed et al. [18], in their comprehensive review, prevalent misconceptions regarding pertussis risk and vaccine efficacy adversely affect vaccination intentions. Widdershoven et al. [25] examined the influence of psychosocial and organizational aspects, indicating that overcoming these obstacles is crucial for enhancing vaccination uptake. Enhancing healthcare professionals' expertise and confidence in vaccine recommendations is essential to address these difficulties [20].

The vaccine talk should also be timely and contextual. To add, it has pointed out that research has indicated clearly that articles state that "when HCPs have a discussion of vaccines at a routine antenatal visit, it's high in correlation with uptakes in vaccines significantly" [24]. This is also in tandem with studies that showed a proactive attitude of HCPs overcomes fears and increases acceptance among pregnant women [20]. In addition, the general environment in healthcare, including vaccination availability and public health campaigns, may also influence women's choices toward vaccination [23], [6]. Maisa et al. [16] emphasized the necessity of overcoming socio-cultural obstacles to vaccination, which can be alleviated by focused interventions such as community workshops.

Pertussis, or whooping cough, is a severe respiratory tract infection that carries substantial risks for newborns in the first months of their life. Maternal immunization during pregnancy is one of the most effective methods to protect the mother and her baby by transferring maternal antibodies, protecting the newborn with early immunity. Nonetheless, despite its advantages, the use of the pertussis vaccine among pregnant women in urban Jordan is still minimal. Wilcox et al. [26] underscored that coordinated marketing and robust endorsements from healthcare experts are essential for enhancing these rates. Quattrocchi et al. [21] emphasized that continuous medical advice throughout pregnancy can improve immunization rates, especially when combined with educational initiatives.

This current study assesses the knowledge, attitudes, and factors influencing the pertussis vaccine uptake among pregnant women in urban Jordan. Current evidence shows that the pertussis vaccine uptake in this population may be majorly influenced by their knowledge and perception of the vaccine per se, health providers, and health context. Improvement in vaccination rates would require filling critical knowledge gaps and misconceptions about pertussis and its vaccine, with the empowerment of health providers to support vaccination confidently. The identified factors contributing to low vaccination rates include a lack of knowledge of pertussis, a negative attitude toward vaccination in pregnancy, and socioeconomic barriers, all intensified by insufficient information and support from the providers themselves. This study's essential contribution is in its potential to guide the targeted development of interventions aimed at increasing vaccine coverage that improves maternal and infant health outcomes through increasing vaccine coverage.

Materials and Methods

This quantitative, cross-sectional study explores the factors that influence the pertussis vaccine uptake among pregnant women. The target population will be pregnant women aged between 18 and 45 attending antenatal clinics in urban areas of Jordan. Data collection will take two months, starting in October and ending in November 2024. The estimated sample size is about 300 women, which is sufficient to offer a panel with the desired statistical power.

Data will be collected through the use of a structured and validated questionnaire. These questionnaires will aim to elicit information on demographic data, knowledge of pertussis and its vaccine, attitude towards vaccination, and factors that influence whether to vaccinate. Arabic and English shall be used for the questionnaires due to consideration of the language preference in which each participant shall answer comprehensively. This tool has been segmented into five sections designed to capture comprehensive information to help ascertain the factors influencing pertussis vaccine uptake among pregnant women.

Section 1: Demographic Information

This section provided background information on the participants regarding age, education level, employment status, household income, and the number of children. The age brackets were from 18-25 to 41-45 years, and the sample was evenly spread across those groups. The education level ranged from no formal education to university degrees, meaning a mixed sample of uneducated and educated people. Employment status included full-time, part-time, homemaker, retired, student, and unemployed. Income data regarding the respondents' financial status was also collected. The family size ranged from none to three or more, which may or may not influence every family's healthcare decision.

Section 2: Pregnancy Information

This section asked the participants about their state of pregnancy. The women specified if it was their first, second, or third (or more) pregnancy; the responses were pretty evenly distributed. Conception trimester information was based on all three stages of pregnancy. Participants were asked if they had received the pertussis vaccine, and the results reflected an almost equal divide. Additionally, their reasons were sought for those not vaccinated, whether for fear of safety concerns, cultural beliefs, lack of awareness, or if they wanted to be vaccinated at a different time.

Section 3: Knowledge About Pertussis and the Vaccine

In this section, the level of participants' knowledge about pertussis and the vaccine was assessed. The section evaluated whether they had heard of pertussis and from what source they obtained the information (family, health care, media) [12], [3]. They asked them if they thought the disease was dangerous for newborns and if they knew the vaccine's recommendations. Finally, they completed ratings of their beliefs in vaccine safety, from confident down to unsure to skeptical.

Section 4: Attitudes Toward Vaccination

Participants' attitudes on vaccination were assessed using items on the perceived importance of immunization and belief in vaccine safety. The participants' responses to items capturing the influence of healthcare provider recommendations gauged how important professional advice had been in making decisions. This section also captured their response regarding receiving information from healthcare providers and trusting them, engagement with which turned out to be variable.

Section 5: Factors Affecting Vaccine Uptake

This section discussed discouraging and encouraging factors regarding vaccine uptake. The participants identified motivators like a meager chance of any harm from the vaccine and strong recommendations on healthcare and vaccination being either accessible or affordable. Discouraging factors included safety, lack

of information, and cultural or religious beliefs. Sufficiency of available information on the subject was observed, and preferred sources to learn more about vaccines, such as healthcare providers, social media, or community workshops. Finally, perceptions of healthcare system support were evaluated, showing whether participants felt supported in vaccination decisions.

Descriptive statistics describe demographic data, knowledge of pertussis, and attitude toward the vaccine against pertussis. Chi-square tests outline significant associations between selected key variables and vaccine uptake. All statistical analyses are performed at the significance level, $p < 0.05$, to establish meaningful associations revealing causative variables of vaccination behavior.

Ghazy et al. [10] reported the reliability tests of the questionnaire as follows: excellent internal consistencies with a Cronbach's alpha coefficient of 0.92 across all question sections. The high score depicts that items in each section, which involve demographic data, details concerning pregnancy, knowledge of pertussis and the vaccine, attitude towards vaccination, and factors affecting vaccine uptake, are highly related and measure the constructs as intended. The strong reliability coefficient confirms that the instrument is robust and well-suited for assessing the factors affecting pertussis vaccine uptake among pregnant women in South Jordan.

Results Analysis

Table 1 summarizes the demographic profile of 300 pregnant women in the study. The age distribution was pretty even, with the largest group being 26-30 years (25.7%), followed by 18-25 years (20.3%), 31-35 years (19%), 36-40 years (17.7%), and 41-45 years (17.3%). Educational attainment varied, with 24.7% having no formal education, 21% holding postgraduate degrees, 20% with primary education, 19.3% with secondary education, and 15% having university degrees. Employment status showed diversity: 19.7% were unemployed, 17% worked part-time, 16.7% were retired, and 16.3% were full-time employees or students, with homemakers making up 14%. Household income also varied, with 22.7% earning less than 300 JOD, while only 13.7% earned more than 1200 JOD.

Family size was diverse, with 28% of women having three or more children, 26% having two, 22.3% having one, and 23.7% reporting no children. This demographic variation is crucial for understanding how different factors may influence pertussis vaccine uptake, providing a comprehensive backdrop for analyzing this population's knowledge, attitudes, and behaviors.

Table 1 Demographic Profile for the study participations.

Section	Category	Frequency	Percent
Age	18-25	61	20.3
	26-30	77	25.7
	31-35	57	19
	36-40	53	17.7
	41-45	52	17.3
	Total	**300**	**100**
Educational Level	No formal education	74	24.7
	Postgraduate degree	63	21
	Primary education	60	20
	Secondary education	58	19.3
	University degree	45	15
	Total	**300**	**100**
Employment Status	Employed (full-time)	49	16.3
	Employed (part-time)	51	17

	Homemaker	42	14
	Retired	50	16.7
	Student	49	16.3
	Unemployed	59	19.7
	Total	**300**	**100**
Household Monthly Income	300-600 JOD	46	15.3
	601-900 JOD	56	18.7
	901-1200 JOD	45	15
	Less than 300 JOD	68	22.7
	More than 1200 JOD	41	13.7
	I prefer not to say	44	14.7
	Total	**300**	**100**
Number of Children	1	67	22.3
	2	78	26
	Three or more	84	28
	None	71	23.7
	Total	**300**	**100**

Table 2 overviews the participants' pregnancy information and vaccine uptake. A nearly equal distribution was seen in current pregnancy status, with 35.7% of women having their third or more pregnancies, 34.7% experiencing their first pregnancy, and 29.7% on their second. Trimester distribution was similarly balanced, with 34% in the first trimester, 33.7% in the second, and 32.3% in the third. Pertussis vaccine uptake was almost evenly split, with 50.7% not receiving the vaccine and 49.3% who did.

Reasons for not receiving the vaccine varied. The most common reason was not receiving a recommendation from a healthcare provider (19%), followed by being unaware of the vaccine (17.7%). Safety concerns (14.3%), cultural or religious beliefs (14.7%), and planning to receive the vaccine later (17.3%) were also noted. Additionally, 17% cited other reasons. This data highlights essential factors that may influence vaccine decisions during pregnancy, providing context for targeted interventions.

Table 2 Pregnancy Information and Vaccine Uptake Overview.

Section	Category	Frequency	Percent
Current Pregnancy	First pregnancy	104	34.7
	Second pregnancy	89	29.7
	Third or more pregnancy	107	35.7
Trimester	First trimester (1-12 weeks)	102	34
	Second trimester (13-26 weeks)	101	33.7
	Third trimester (27-40 weeks)	97	32.3
Received Pertussis Vaccine	No	152	50.7
	Yes	148	49.3
Reason for Not Receiving Vaccine	Concerned about safety	43	14.3
	Cultural or religious reasons	44	14.7
	Did not receive a recommendation from a healthcare provider	57	19
	Not aware of the vaccine	53	17.7
	Other	51	17
	Planning to receive it later in the pregnancy	52	17.3

Table 3 outlines the knowledge and awareness of pertussis and the vaccine among pregnant women. More than half (51.3%) of participants had not heard about pertussis, while 48.7% were aware. The primary sources of information were family or friends (22%) and the internet or social media (22%), followed by healthcare providers (16%), other unspecified sources (21%), and television or radio (19%). Regarding understanding the danger of pertussis for newborns, 55% did not perceive it as dangerous, while 45% did. Awareness of the vaccine recommendation was evenly split, with 50.3% aware and 49.7% not aware. When asked about the vaccine's safety, 33.3% believed it was unsafe, 37% were unsure, and 29.7% thought it was secure. These findings suggest a gap in knowledge and confidence about the pertussis vaccine, highlighting a potential area for educational interventions to improve awareness and trust.

Table 3 Knowledge and Awareness of Pertussis and Vaccine Among Pregnant Women.

Section	Category	Frequency	Percent
Heard About Pertussis	No	154	51.3
	Yes	146	48.7
Source of Information About Pertussis	Family or friends	66	22
	Healthcare provider	48	16
	Internet or social media	66	22
	Other	63	21
	Television or radio	57	19
Dangerous for Newborns	No	165	55
	Yes	135	45
Aware Vaccine Recommended	No	149	49.7
	Yes	151	50.3
Believe Vaccine is Safe	No	100	33.3
	Unsure	111	37
	Yes	89	29.7

Table 4 describes pregnant women's attitudes toward pertussis vaccination in South Jordan. The perceived importance of vaccination varied, with 37.3% of women considering it somewhat important, 34.7% not necessary, and 28% significant. Confidence in vaccine safety was mixed, with 26.3% not confident, 24.3% somewhat confident, 24.3% very confident, and 25% unsure. The influence of healthcare recommendations showed that a healthcare provider's advice would sway 36.7% of participants, 33% said no, and 30.3% were unsure. Just over half (52.7%) had received information about the vaccine from a healthcare provider, while 47.3% had not. Trust in healthcare information was also divided, with 35.7% unsure, 34.3% trusting, and 30% not trusting. These attitudes reflect a significant need for effective communication and trust-building efforts by healthcare professionals to encourage vaccine uptake.

Table 4 Attitudes Toward Pertussis Vaccination Among Pregnant Women in the South of Jordan.

Section	Category	Frequency	Percent
Importance of Vaccination	Not important	104	34.7
	Somewhat important	112	37.3
	Very important	84	28
Confidence in Vaccine Safety	Not confident	79	26.3
	Somewhat confident	73	24.3
	Unsure	75	25
	Very confident	73	24.3
Influence of Healthcare Recommendation	Maybe	91	30.3
	No	99	33

	Yes	110	36.7
Received Info from Healthcare Provider	No	142	47.3
	Yes	158	52.7
Trust in Healthcare Information	No	90	30
	Unsure	107	35.7
	Yes	103	34.3

Table 5 presents the factors influencing pertussis vaccine uptake among pregnant women in South Jordan. Several factors were identified as encouraging vaccination. A strong recommendation from a healthcare provider was the most influential, cited by 37.3% of participants, followed by assurance of vaccine safety (32.7%) and information sessions or workshops (33%). Free or low-cost vaccination and support from family or friends were also important, influencing 31.3% and 29.3% of participants, respectively.

Discouraging factors included concerns about vaccine safety and influence from family or friends, reported by 34.3% of women, followed closely by cultural or religious beliefs (32.7%) and fear of side effects (32%). The availability of sufficient information was a notable issue, with 35.7% of participants unsure if they had enough information, 33.7% stating they did not, and only 30.7% confirming sufficient information. Preferred sources of information included healthcare providers (31.7%) and the Internet or social media (39.3%), indicating a reliance on personal and digital sources for health guidance. Additionally, healthcare system support needed to be more balanced, with 36% unsure about available support, 31.7% reporting no support, and 32.3% affirming support. This highlights the importance of clear communication and strong healthcare advocacy to improve vaccine uptake.

Table 5 Factors Influencing Pertussis Vaccine Uptake Among Pregnant Women in the South of Jordan.

Section	Category	Frequency	Percent	Percent of Cases
Encouraging Factors	Assurance of vaccine safety	98	16.7	32.7
	A strong recommendation from a healthcare provider	112	19	37.3
	Free or low-cost vaccination	94	16	31.3
	Information sessions or workshops	99	16.8	33
	Support from family or friends	88	15	29.3
	Other	97	16.5	32.3
Discouraging Factors	Concerns about vaccine safety	103	17.4	34.3
	Lack of information	92	15.6	30.7
	Cultural or religious beliefs	98	16.6	32.7
	Fear of side effects	96	16.2	32
	Influence from family or friends	103	17.4	34.3
	Other	99	16.8	33
Sufficient Info Available	No	101	33.7	
	Unsure	107	35.7	
	Yes	92	30.7	
Preferred Information Sources	Healthcare providers	95	15.7	31.7
	Internet or social media	118	19.4	39.3
	Television or radio	100	16.5	33.3
	Community workshops	96	15.8	32
	Printed materials (brochures, flyers)	95	15.7	31.7

	Other	103	17	34.3
Healthcare System Support	No	95	31.7	
	Unsure	108	36	
	Yes	97	32.3	

The Chi-Square test results reveal significant associations between critical variables and pertussis vaccine uptake among pregnant women in South Jordan, as shown in Table 6. For Knowledge About Pertussis and Vaccine Uptake: The Chi-Square is 8.34 with an accompanying probability of 0.004, which suggests that the association is significant. This result points to knowledge as leading to vaccination decisions. Awareness of Vaccine Recommendation and Vaccine Uptake: Chi-Square value of 16.32, a p-value of 0.0005 identifies a significant relationship. The result underlines the influence of knowing vaccine recommendations on the likelihood of actual vaccination. Moreover, the association between the Importance of Vaccination-Vaccine Uptake is statistically significant with a Chi-Square value of 13.71 and a p-value of 0.0016, meaning that how women perceive the importance of vaccination influences their decision to get the vaccine. These findings indicate the need to raise awareness and work out a practical communicational approach to increase vaccination rates.

Table 6 Chi-Square Test Results.

Variable Pair	Chi-Square Value	p-Value	Degrees of Freedom
Knowledge About Pertussis vs. Received Pertussis Vaccine	**8.339263476**	**0.004**	**1**
Awareness of Vaccine Recommendation vs. Received Pertussis Vaccine	**16.3219259**	**0.0005**	**1**
Importance of Vaccination vs. Received Pertussis Vaccine	**13.71118653**	**0.0016**	**2**

Discussion

The current study investigated knowledge about the pertussis vaccine, attitudes toward it, and factors influencing its uptake among pregnant women in South Jordan. These findings provide critical insights into how various elements influence vaccination decisions that significantly contribute to the understanding of public health. Besides, demographic data represented equal distributions of age while broad spectrums of educational and economic background were represented. The diverse sample thus provides a deep look at preliminary factors associated with vaccine uptake. Relevant pregnancy data showed that more or less the same amount fell into either stage of not vaccinated and vaccinated: 50.7 percent not vaccinated versus 49.3 percent vaccinated, and thus could portray an understanding of underlying behavioral influences.

Knowledge and vaccination status were highly associated, and chi-square results indicated that knowing pertussis is associated with a significantly higher likelihood of vaccination at $p = 0.004$. This reflects the findings of other studies suggesting that knowledge is the primary determinant of preventive health behavior. Examples are found by Donaldson et al., 2015; Boedeker et al., 2014. The same trend was observed in South Australia, where knowledge and awareness proved to be a strong predictor of vaccine uptake. On the other hand, a study from Ireland shows that people know about vaccination. Still, socioeconomic barriers hinder vaccination rates, so awareness needs to be supplemented by access and affordability measures.

Another critical determinant was awareness of vaccination recommendations. The association is highly significant, according to chi-square analysis, $p = 0.0005$, clearly indicating that vaccination status was

considerably higher for women who were aware of vaccination guidelines. This trend is also evident in a similar study from the UK, which pointed out that physician recommendations were among the most potent determinants of vaccine acceptance. By contrast, a German study found that physician endorsement was strong yet required repetition via messaging and community-level education to be fully realized.

Another significant predictor of the intention to vaccinate was the attitude toward vaccination. A Chi-square value of 13.71 ($p = 0.0016$) showed that women who perceived vaccination as necessary were more likely to get vaccinated, which is in line with the findings of a meta-analysis whose results found perceived benefits from vaccination to be among those factors that most strongly influence uptakes. Whatever the case, it was noted that in the Northern Ireland study, most of the women were concerned about possible side effects, even though they were aware of the benefits of the vaccine, indicating how emotional feelings can override knowledge and awareness. Indeed, a more recent study in Saudi Arabia showed that education and employment status were the strong predictors of vaccine acceptance; educated women are more likely to perceive vaccines as safe.

Comparisons across regions reveal essential differences. For example, a midwife-delivered program in South Australia significantly increased vaccination rates, suggesting that the method of delivery can affect outcomes. In Israel, on the other hand, cultural factors played a more significant role, with native-born women demonstrating higher acceptance rates than women from the former Soviet Union, suggesting that diverse populations may require tailored messaging.

Therefore, the study attained its objectives by identifying the influential factors, such as knowledge, attitudes, and awareness, that affect the uptake of the pertussis vaccine. The paper, therefore, calls for an approach to improving information and health recommendations, presenting useful implications for the design of public health strategies. These findings have brought into focus the need for improved communication between health providers and pregnant women to reiterate the safety and benefits of the vaccine.

This would contribute significantly to maternal and child health, as there is minimal information on pertussis vaccination in South Jordan. This study illustrates the strong influence of knowledge and healthcare communication and suggests that provider training and awareness campaigns might improve vaccine uptake. In addition, this study argues that attitudes toward vaccination are also necessary to address through community workshops.

However, there are some limitations: the sample comprises only urban South Jordan and thus might not represent the rural population; there is also a risk of recall bias because of using self-reported data. The casual inferences are limited because this is a cross-sectional design. Further studies should be conducted by expanding samples, using longitudinal methods whenever possible, and considering other cultural or social factors affecting vaccine uptake.

Conclusion

Key findings show that knowledge and awareness are important in vaccination decisions. Women reporting having heard about pertussis and being aware of the vaccine recommendations had a significantly higher likelihood of taking up the vaccine. This illustrates the value of focused educational effort and the need for healthcare providers to distribute clear, accessible information about vaccines actively. Attitudes toward vaccination also proved influential. It was reported that the perceived greater importance of the vaccine and trust in the safety of the vaccine would most likely lead to vaccination among women. This indicates that misconceptions must be cleared and confidence developed in health information. Healthcare advice is featured prominently, with many citing strong advice from health professionals as one of the most significant influences on vaccination behavior.

This study, therefore, has an overall implication for the need to have improved health communication and culturally adapted public health strategies that could increase uptake. Healthcare systems can support pregnant women in making informed decisions that protect maternal and newborn health by focusing efforts to improve knowledge and address perceptions. Even with the limitations of our study, it offers some valuable insights for future interventions. It underlines the continuing importance of attempting to improve vaccination through education and trust-building initiatives.

References

1. R. A. Al-Rashdan, W. A. Ta'an, T. Mukattash, and B. Williams, "Maternal skepticism regarding children's vaccination in Jordan: Investigating the knowledge, attitude, and adherence," Plos one, vol. 19, no. 7, p. e0305209, 2024.
2. F. Alshahrani, "Awareness and acceptance of pertussis vaccination among pregnant women in Taif region, Saudi Arabia: a cross-sectional study," Cureus. [Online]. Available: https://doi.org/10.7759/cureus.41726. [Accessed: Nov. 18, 2024].
3. A. Arreciado Marañón et al., "Knowledge, perceptions, attitudes, and practices of midwives regarding maternal influenza and pertussis vaccination: a qualitative study," Int. J. Environ. Res. Public Health, vol. 19, no. 14, p. 8391, 2022.
4. Ayouni, E. Amponsah-Dacosta, S. Noll, B. M. Kagina, and R. Muloiwa, "Interventions to Improve Knowledge, Attitudes, and Uptake of Recommended Vaccines during Pregnancy and Postpartum: A Scoping Review," Vaccines, vol. 11, no. 12, p. 1733, 2023.
5. M. Ben Natan, B. E. Kravchenko, K. Sakashidlo, and S. Mor, "What drives pregnant women's decisions to accept the pertussis vaccine?," Appl. Nurs. Res., vol. 38, pp. 60–63, 2017.
6. B. Bödeker, C. Betsch, and O. Wichmann, "Skewed risk perceptions in pregnant women: the case of influenza vaccination," BMC Public Health, vol. 15, no. 1, 2015. [Online]. Available: https://doi.org/10.1186/s12889-015-2621-5. [Accessed: Nov. 18, 2024].
7. B. Boedeker, D. Walter, S. Reiter, and O. Wichmann, "Cross-sectional study on factors associated with influenza vaccine uptake and pertussis vaccination status among pregnant women in Germany," Vaccine, vol. 32, no. 33, pp. 4131–4139, 2014.
8. S. Böhm et al., "Influenza and pertussis vaccination during pregnancy – attitudes, practices and barriers in gynecological practices in Germany," BMC Health Serv. Res., vol. 19, no. 1, 2019. [Online]. Available: https://doi.org/10.1186/s12913-019-4437-y. [Accessed: Nov. 18, 2024].
9. B. Donaldson et al., "What determines the uptake of the pertussis vaccine in pregnancy? A cross-sectional survey in an ethnically diverse population of pregnant women in London," Vaccine, vol. 33, no. 43, pp. 5822–5828, 2015.
10. R. M. Ghazy et al., "Compulsory Vaccination Coverage in 12 Sub-Saharan African Countries Two Years Following the COVID-19 Pandemic," J. Community Health, vol. 49, no. 2, pp. 193–206, 2024.
11. C. Healy et al., "Knowledge and attitudes of pregnant women and their providers towards recommendations for immunization during pregnancy," Vaccine, vol. 33, no. 41, pp. 5445–5451, 2015.
12. F. Jiang et al., "Knowledge and willingness toward vaccination among pregnant women: comparison between pertussis and influenza," Int. J. Environ. Res. Public Health, vol. 19, no. 21, p. 14082, 2022.
13. T. Khan et al., "Factors influencing vaccine acceptance in pregnancy during the COVID-19 pandemic: A multicenter study from West Bengal, India," Hum. Vaccin. Immunother., vol. 20, no. 1, p. 2383030, 2024.

14. E. Kilich et al., "Factors influencing vaccination decision-making among pregnant women: A systematic review and meta-analysis," PLoS ONE, vol. 15, 2020.
15. D. MacDougall et al., "Knowledge, attitudes, beliefs, and behaviors of pregnant women approached to participate in a tap maternal immunization randomized, controlled trial," Hum. Vaccin. Immunother., vol. 12, no. 4, pp. 879–885, 2016. [Online]. Available: https://doi.org/10.1080/21645515.2015.1130193. [Accessed: Nov. 18, 2024].
16. A. Maisa et al., "Vaccination against pertussis and influenza in pregnancy: A qualitative study of barriers and facilitators," Public Health, vol. 162, pp. 111–117, 2018.
17. H. Mohammed et al., "Factors associated with uptake of influenza and pertussis vaccines among pregnant women in South Australia," PLoS ONE, vol. 13, 2018.
18. H. Mohammed et al., "A systematic review of interventions to improve uptake of pertussis vaccination in pregnancy," PLoS ONE, vol. 14, no. 3, p. e0214538, 2019. [Online]. Available: https://doi.org/10.1371/journal.pone.0214538. [Accessed: Nov. 18, 2024].
19. H. Mohammed et al., "Psychosocial determinants of pertussis and influenza vaccine uptake in pregnant women: A prospective study," Vaccine, 2020.
20. X. Qiu, H. Bailey, and C. Thorne, "Barriers and facilitators associated with vaccine acceptance and uptake among pregnant women in high-income countries: a mini-review," Front. Immunol., vol. 12, 2021. [Online]. Available: https://doi.org/10.3389/fimmu.2021.626717. [Accessed: Nov. 18, 2024].
21. A. Quattrocchi et al., "Determinants of influenza and pertussis vaccine uptake in pregnant women in Ireland: A cross-sectional survey in 2017/18 influenza season," Vaccine, 2019.
22. M. S. Rane, J. Wakefield, P. Rohani, and M. E. Halloran, "Using surveillance data, the association between pertussis vaccination coverage and other sociodemographic factors and pertussis incidence," Epidemics, vol. 44, p. 100689, 2023.
23. S. Rowe et al., "Influenza and pertussis vaccination of women during pregnancy in Victoria, 2015–2017," Med. J. Aust., vol. 210, no. 10, pp. 454–462, 2019. [Online]. Available: https://doi.org/10.5694/mja2.50125. [Accessed: Nov. 18, 2024].
24. C. Ugezu and M. Essajee, "Exploring patients' awareness and healthcare professionals' knowledge and attitude to pertussis and influenza vaccination during the antenatal periods in Cavan Monaghan General Hospital," Hum. Vaccin. Immunother., vol. 14, no. 4, pp. 978–983, 2018. [Online]. Available: https://doi.org/10.1080/21645515.2017.1419110. [Accessed: Nov. 18, 2024].
25. V. Widdershoven et al., "Maternal pertussis vaccination behavior: Psychosocial, attitudinal and organizational factors," Vaccine, vol. 41, no. 49, pp. 7469–7475, 2023.
26. C. Wilcox et al., "Determinants of influenza and pertussis vaccination uptake in pregnancy: A multicenter questionnaire study of pregnant women and healthcare professionals," Pediatr. Infect. Dis. J., vol. 38, no. 6, pp. 625–630, 2019.