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Determinants of Completing Child Immunization Program Among Mothers

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Abstract: Immunization is one of the most effective public health interventions, preventing numerous infectious diseases and saving millions of lives annually. Despite its benefits, many children remain under-vaccinated due to various barriers. The role of mothers in ensuring the completion of childhood immunization is critical, yet their adherence is influenced by multiple factors such as education, socioeconomic status, and healthcare accessibility. This study aims to assess the determinants affecting the completion of the child immunization program among mothers in Najaf Governorate. It also seeks to examine the relationship between maternal attitudes toward immunization and their demographic characteristics. A descriptive cross-sectional study was conducted from September 1, 2024, to February 20, 2025. A purposive sample of 90 mothers participated in the study through an electronic questionnaire distributed via social media. Data collection focused on demographic variables and maternal attitudes toward completing the immunization schedule. Statistical analysis was performed using SPSS version 26, employing descriptive and inferential statistics, including Chi-square and Pearson's correlation tests. The study found that 48.9% of mothers always adhered to the vaccination schedule, while 42.6% followed it only sometimes, and 8.5% never adhered. The primary barrier to vaccination was difficulty in accessing healthcare (63.8%), followed by health or cultural concerns (28.7%) and lack of awareness (7.4%). Statistical analysis revealed a significant association between maternal attitudes toward immunization and their educational level ($p=0.05$) and place of residence ($p=0.04$). Other demographic factors showed no significant correlation. The findings indicate that maternal education and accessibility to healthcare significantly influence immunization adherence. The study recommends targeted health education campaigns, improved healthcare access, and community-based awareness programs to enhance vaccination coverage. Future research should explore additional factors influencing vaccine hesitancy and assess interventions to improve immunization rates.
Keywords: Mother, Immunization, Child

Introduction

Immunization is one of the most effective and important public health interventions, contributing to the prevention of countless diseases and saving millions of lives annually. It is defined as the process of enhancing the immune system's ability to combat infectious diseases through exposure to specific antigens, which stimulate the body to produce a protective immune response. (Zahraa Ahmed Hassan & Mohammed Jasim Ahmed, 2018).

Immunization can occur through two main mechanisms: active immunization, where the body generates immune memory after exposure to antigens, and passive immunization, where pre-formed antibodies are provided to offer temporary protection. Both forms play a crucial role in protecting individuals, particularly children, against life-threatening diseases. (WHO, 2018;Zahraa Ahmed Hassan & Mohammed Jasim Ahmed, 2018).

A vaccine is a biological preparation that stimulates the immune system to produce an immune response, enabling the body to fight pathogens when exposed to them in the future and providing protection upon infection.

Vaccines are considered one of the greatest medical achievements, significantly improving public health and offering protection from infectious diseases such as smallpox, hepatitis B, and many others. (WHO, 2019).

The Importance of Childhood Vaccination Childhood vaccination is one of the most significant public health interventions, as vaccines provide long-term immunity and play a vital role in preventing

infectious diseases and reducing child mortality. Vaccines protect children from numerous diseases, and the World Health Organization (WHO), consistently emphasizes the effectiveness of vaccination programs in addressing global health challenges. (Wafa'a F. Ta'an et al., 2024 ;Miracle A. Adesina et al., 2023).

The importance of immunization extends beyond individual protection to collective community health. Achieving herd immunity protects vulnerable populations who cannot receive vaccines for medical reasons, thereby reducing the overall spread of infectious diseases. This collective benefit underscores the urgent need to address barriers to vaccination and ensure equitable access to immunization services. (Wafa'a F. Ta'an et al., 2024; Essam M. Abdalsaid et al., 2017; Miracle A. Adesina et al., 2023)

Vaccination programs are essential for controlling and eliminating diseases such as measles, polio, diphtheria, and hepatitis. According to the WHO, vaccines prevent over 4.4 million deaths annually and have significantly reduced the global burden of infectious diseases. Despite these achievements, the global vaccination landscape still faces challenges. (Adesina et al., 2023)

Through initiatives like the Expanded Program on Immunization (EPI), the WHO has worked to address these gaps. The EPI focuses on increasing access to vaccines that combat childhood diseases, particularly in low-resource settings (Adesina et al., 2023). However, significant child mortality persists, largely due to vaccine-preventable diseases (VPDs) such as malaria, pneumonia, and measles, especially among children under five. Additionally, challenges such as inadequate healthcare infrastructure, vaccine hesitancy, and low awareness—particularly in rural areas where access to immunization services remains limited—continue to pose significant barriers. (Oladepo et al., 2019).

Despite global efforts, many children remain under-vaccinated or completely unvaccinated. For example, while the spread of many infectious diseases has been curtailed or even eradicated in some regions, such as polio

in the United States, challenges remain in achieving universal coverage, especially in areas with low socioeconomic conditions. (Zahraa Ahmed Hassan & Mohammed Jasim Ahmed, 2018; Adesina et al., 2023; Wafa'a F. Ta'an et al., 2024) .

The success of immunization programs depends not only on vaccine availability but also on the willingness and ability of caregivers, especially mothers, to adhere to vaccination schedules. Mothers, as primary caregivers, play a pivotal role in ensuring their children receive timely and complete vaccinations. However, many barriers impede this process. Socioeconomic factors, including low income, lack of education, and limited access to healthcare facilities, significantly affect vaccination completion rates. (Adesina et al., 2023)

In Iraq, particularly in Najaf Governorate, similar challenges persist. Although studies in the region are limited, other research highlights that mothers' knowledge, beliefs, and attitudes toward vaccination are critical factors for completing vaccination schedules. Negative rumors, fear of side effects, and mistrust of healthcare providers often lead to vaccine hesitancy among mothers. (Wafa'a F. Taan et al., 2024 ; Miracle A. Adesina et al., 2023) .

Vaccine hesitancy refers to the delay in acceptance or refusal of vaccines despite the availability of vaccination services. The WHO identifies this term as one of the three major global health challenges. Vaccine hesitancy is complex, context-dependent, and influenced by factors such as:

Low confidence in vaccine effectiveness, safety, or the healthcare system.

Convenience issues, such as limited accessibility or cost of vaccination services. Social and cultural influences affecting vaccination decisions. This hesitancy can manifest in various forms, such as postponing initial vaccinations, limiting doses per visit, avoiding certain types of vaccines, or failing to catch up on missed vaccinations. (WHO, 2019). Primarily, mothers' knowledge and attitudes significantly affect the completion of children's vaccination schedules. Studies confirm that limited awareness among mothers about vaccine-preventable diseases and the importance of vaccination contributes to low coverage rates. Moreover, gaps in understanding the risks associated with not

vaccinating often lead to hesitancy or neglect in adhering to vaccination schedules. (Adesina et al., 2023).

Access to healthcare facilities is another critical factor. Logistical challenges, including the distance to vaccination centers and limited healthcare infrastructure, disproportionately affect rural populations, discouraging mothers from completing vaccination schedules. (Masibo et al., 2024) .

Cultural and religious beliefs present additional barriers. Misconceptions about vaccine safety, fueled by misinformation within communities, often prevent mothers from vaccinating their children. Addressing these deep-rooted concerns requires targeted educational interventions to effectively disseminate accurate information about the importance of vaccines in protecting children. (Wafa'a F. Ta'an et al., 2024)

Socioeconomic factors also play a pivotal role in vaccination completion. Mothers with higher education levels and better socioeconomic status are significantly more likely to vaccinate their children fully. Conversely, poverty and lack of education often limit access to healthcare and increase reliance on misinformation, exacerbating vaccine hesitancy (Johanna Nurmi et al., 2022; Yoshiki Kuroda et al., 2018; Adesina et al., 2023).

Additionally, studies emphasize the role of maternal education in improving vaccination rates. Mothers with higher levels of education are four times more likely to ensure their children complete vaccination schedules than those without formal education. (Fenta et al., 2021).

Completing immunization programs not only protects children's health but also supports public health by achieving herd immunity and reducing the burden of infectious diseases on communities. Raising maternal awareness, improving education levels, and ensuring access to healthcare services are crucial factors in ensuring vaccination completion. These efforts also help reduce child mortality and prevent vaccine-preventable diseases. Prenatal and postnatal care visits and physicians' recommendations are essential in ensuring vaccination completion, ultimately reducing child mortality and improving their quality of life. Therefore, awareness and education campaigns are vital tools for achieving comprehensive vaccination coverage. (Wafa'a F. Ta'an et al., 2024 ; Miracle A. Adesina et al., 2023)

The Importance of Study

Immunization is a cornerstone of public health and is known to prevent life-threatening diseases and reduce child mortality rates worldwide (Adesina et al., 2023) .

However, significant gaps in vaccination coverage remain, especially in developing countries such as Iraq, and in particular Najaf Governorate, where social, economic, and regulatory barriers hinder access to immunization. This study is of great importance as it sheds light on the specific factors that influence mothers' decisions to complete their children's vaccination schedules in Najaf Governorate.

By examining factors such as maternal education, socioeconomic status, cultural beliefs, and access to healthcare, the research seeks to provide insights into the challenges facing mothers and make recommendations to improve vaccination coverage. Addressing these issues is essential to improve vaccination rates, achieve herd immunity, and prevent the spread of vaccine-preventable diseases in Iraqi communities. Understanding these factors is essential to reduce childhood morbidity and mortality and ensure a healthier future for children in Iraq.

Statement of the Problem

Determinants of completing child immunization program among mothers.

Objectives of The Study

1. To assess the determinants that interfere with completing vaccination program among mothers.
2. To find out the relationship between the attitude of the mothers towards completing the vaccination program and their demographics.
3. To assess the main determinant of completing the vaccination program .

Definition of Terms

A. Immunization:

1) Theoretical Definitions:

Refers to the process by which the immune system becomes resistant to infectious diseases through exposure to antigens, either through active

immunization (via vaccines) or passive immunization (via transferred antibodies). This process is crucial for promoting public health and preventing the spread of diseases (Zahraa Ahmed Hassan & Mohammed Jasim Ahmed, 2018).

2) Operational Definitions:

The act of a mother ensuring that her child receives all required vaccinations according to the national immunization schedule within the designated time frame.

B. Vaccine:

1) Theoretical Definitions:

Is a biological agent that stimulates the immune system to produce antibodies, thereby conferring immunity against a specific disease? Vaccines play a critical role in disease prevention by inducing an immune response without causing the disease itself (Zahraa Ahmed Hassan & Mohammed Jasim Ahmed, 2018).

2) Operational Definitions:

Any vaccine administered to a child as part of the national immunization program, which may include vaccines for diseases such as measles, polio, diphtheria, Hepatitis -B, and tetanus.

C. Vaccine-Preventable Diseases (VPDs):

1) Theoretical Definitions:

These are infectious diseases that can be prevented or controlled or reduce its intensity through vaccination (Adesina et al., 2023).

2) Operational Definitions:

VPDs are specific diseases that are part of the national immunization program for children in Najaf, Iraq, and can be prevented through vaccines. Examples include diseases such as measles, rubella, and diphtheria.

D. Herd Immunity:

1) Theoretical Definitions:

Herd immunity occurs when a large portion of a population becomes immune to an infectious disease, either through vaccination or previous infection, thus indirectly protecting those who are not immune. This phenomenon reduces the overall transmission of the disease within the community (WHO, 2019).

2) Operational Definitions:

The proportion of mothers in the community in Najaf whose children have completed the full immunization schedule, thereby contributing to the reduction in the transmission of vaccine-preventable diseases in the population.

E. Vaccine Hesitancy:

1) Theoretical Definitions:

Vaccine hesitancy is defined as the reluctance or refusal to vaccinate despite the availability of vaccination services. It is influenced by a complex interplay of cultural, social, psychological, and systemic factors that affect individuals' decisions to accept or delay vaccination (Oladepo et al., 2019).

2) Operational Definitions:

A mother's reluctance to complete the full immunization schedule for her child, influenced by factors such as concerns about vaccine safety, misinformation, or cultural beliefs.

Literature Review

Vaccines are one of the most effective public health interventions, significantly reducing the burden of infectious diseases worldwide. According to the World Health Organization (WHO), immunization prevents an estimated 2-3 million deaths annually from diseases such as diphtheria, tetanus, pertussis, and measles (WHO, 2018). Vaccines work by stimulating the immune system to recognize and combat pathogens, thereby providing immunity against specific diseases. The importance of vaccines is particularly pronounced in low- and middle-income countries, where access to healthcare is limited, and the burden of vaccine-preventable diseases (VPDs) is high (Adesina et al., 2023).

Vaccination programs have led to the eradication of smallpox and a 94% reduction in polio cases globally. These successes highlight the critical role of vaccines in controlling infectious diseases and preventing disabilities caused by diseases like meningitis and measles (Abegaz et al., 2023).

Reduction in Child Mortality: According to the World Health Organization (WHO), immunization has significantly contributed to the reduction of child mortality, particularly in Sub-Saharan Africa, where children are most vulnerable to diseases like pneumonia, diarrhea, and measles. It not only prevents deaths but also reduces the incidence of disabilities such as mental retardation, hearing loss, and mobility impairment caused by diseases like rubella and meningitis. This underscores the importance of completing the full course of childhood vaccinations (Adesina et al., 2023).

Vaccination provides psychological benefits by reducing parental anxiety about their children's health. Parents can have peace of mind knowing their children are protected from VPDs (Adesina et al., 2023).

Healthy children are more likely to attend school and perform well academically. Vaccination contributes to better educational outcomes by preventing illnesses that lead to school absenteeism (Asfaw et al., 2016).

Vaccination promotes social equity by ensuring that all children, regardless of their socioeconomic status, have access to life-saving vaccines (Masebo et al., 2024).

The WHO's Global Vaccine Action Plan (GVAP) aims to ensure that all children, regardless of their geographic location, have access to life-saving vaccines (Adesina et al., 2023).

Vaccination contributes to herd immunity, protecting those who cannot be vaccinated due to medical conditions. This collective immunity is crucial in preventing outbreaks of VPDs in communities (Abegaz et al., 2023).

Vaccines are considered one of the most cost-effective health interventions, providing long-term benefits by reducing the burden of disease on healthcare systems. The economic benefits of vaccination extend beyond health, contributing to increased productivity and reduced healthcare costs (Masebo et al., 2024;Abegaz et al., 2023).

Adherence to the recommended vaccination schedule is critical for ensuring the effectiveness of immu nization programs. Completing the full course of vaccines provides children with the necessary immunity to protect them from life-threatening diseases. However, defaulting from the

immunization schedule, even for a single dose, can leave children vulnerable to infections. Studies have shown that factors such as maternal education, access to healthcare services, and knowledge about vaccines significantly influence adherence to vaccination schedules. For example, mothers with higher levels of education are more likely to complete their children's immunization schedules compared to those with no formal education (Asfaw et al., 2016; Masebo et al., 2024).

Cultural beliefs and practices significantly influence the acceptance of vaccines. In some communities, traditional beliefs may lead to vaccine hesitancy, as parents may prioritize traditional remedies over

modern medicine. In many communities, cultural norms and traditional beliefs can either facilitate or hinder vaccine uptake. For instance, in some communities, cultural practices such as home births and reliance on traditional healers may lead to delays in immunization or complete avoidance of vaccines (Abegaz et al., 2023; Yoshiki Kuroda et al., 2018;Asfaw et al., 2016; Adesina et al., 2023).

Additionally, cultural misconceptions about vaccines, such as the belief that they cause infertility or are a form of Western control, can further reduce vaccine acceptance (Abegaz et al., 2023).

Stigma and Misinformation: Stigma and misinformation about vaccines can lead to vaccine hesitancy. For example, rumors about vaccine side effects may discourage parents from vaccinating their children (Adesina et al.,2023).

The media can play a dual role in vaccine acceptance. While accurate information can promote vaccination, misinformation spread through social media can lead to vaccine hesitancy (Abegaz et al., 2023).

Community health workers (CHWs) are crucial in bridging the gap between healthcare systems and communities. CHWs can provide culturally sensitive education and encourage vaccine acceptance (Masebo et al., 2024).

In some cultures, gender roles may influence vaccination decisions. For example, in patriarchal societies, fathers may have the final say in whether a child is vaccinated, which can lead to delays or refusal (Asfaw et al., 2016).

Mothers are often the primary decision-makers when it comes to their children's health, including vaccination. Educated mothers are more likely to make informed decisions about immunization (Asfaw et al., 2016).

Maternal knowledge about vaccines and their benefits is a strong predictor of immunization completion. Mothers who are aware of the protective effects of vaccines are more likely to ensure their children receive all recommended doses. Maternal education plays a crucial role in vaccine acceptance. Educated mothers are more likely to understand the benefits of immunization and adhere to vaccination schedules (Asfaw et al., 2016).

A meta-analysis found that mothers with primary education were 1.87 times more likely to complete their children's immunization, while those with secondary education or higher were 3.47 times more likely to do so. This highlights the critical role of education in empowering mothers to make informed decisions about their children's health (Masebo et al., 2024).

Empowering mothers through education and access to healthcare services is crucial for improving immunization rates. Empowered mothers are more likely to advocate for their children's health (Masebo et al., 2024; Adesina et al., 2023).

Working mothers may face challenges in adhering to vaccination schedules due to time constraints (Abegaz et al., 2023).

Older mothers, particularly those aged 35-44, are more likely to complete their children's immunization compared to younger mothers. This may be due to greater experience and awareness of child health (Masebo et al., 2024).

Mothers who utilize maternal health services, such as antenatal care (ANC) and postnatal care (PNC), are more likely to complete their children's immunization. These services provide opportunities for health education and vaccination (Asfaw et al., 2016).

A positive maternal attitude towards immunization is associated with higher vaccination rates. Mothers who perceive vaccines as beneficial are more likely to adhere to the vaccination schedule (Masebo et al., 2024;Abegaz et al., 2023;Adesina et al., 2023).

A study found that mothers who did not attend ANC were 5.4 times more likely to default on their children's immunization compared to those who attended ANC. Similarly, home births and lack of access

to healthcare facilities were associated with lower immunization coverage (Masebo et al., 2024).

Methodology

This chapter deals with the methodology that is used in the present study and it is organized through the following manner:

3.1.Design of the study

A descriptive cross-sectional study approach was designed to meet the previously mentioned objectives of the current study. The period of the study is from 1st Sep. 2024 to 20th Feb. 2025.

3.2. Ethical Consideration

The researcher told each participant that this is voluntary work, and they can leave any time they want or even they didn't want to participate.

3.3. Administrative Agreements

The researchers obtain an approval from the Community Health Nursing Department in the College of Nursing / University of Kufa.

3.4. Setting of the study

This study was conducted through the electronic tool (questionnaire) on the social media in al Najaf city.

3.5. Sample of the study

A Probability (Purposive Sample) of (90) mother was taken in this study.

3.6. the Study instrument

The researchers have adopted the following questionnaire to a determine the objectives of the study, it included the following: -

1) Subjects socio-demographic data (Age/ marital states, number of children, monthly income and residence).

2) part 2 contain statements that obtain the attitude towards completion of immunization program.

3.7. Data Collection

The data collection was done electronically the Arabic version of the questionnaire. The questionnaire was answered by the participants individually without the intervention of the researcher. The data collection process started from January,15,2025 to January,30,2025. The respondents spend about 10-15 minutes to answer all items.

3.8. Statistical Analysis

The following statistical approaches were used in order to analyze the data of the study under application of the statistical package for social sciences (SPSS) version 26 has been used to enter and analyze data from the study sample. Analysis included the two types of statistics:

1) Descriptive statistics:

Presented as mean, frequencies and percentages. Using bar charts and a normal distribution curve, all continuous variables were tested for statistical normality.

2. Inferential Statistics:

According to the distribution and type of variables, statistical tests had been applied.

a. Chi-square test was used foe frequency comparison.

b. Bivariate Pearson's correlation test was used to ascertain the correlations.

c. A significant difference or correlation was defined as a difference or correlation with a level of

significance ≤ 0.0.

Results

Table 1. Descriptive statistics (frequency and percentage) for the demographic data of mothers.

Demographic data	Sub-groups	Frequency (N=94)	Percentage
Age / years	< 20	4	4.3
	21-30	48	51.1
	31-40	42	44.7
Educational Status	Elementary	18	19.1
	Middle school	15	16.0
	Preparatory school	16	17.0
	Higher education (University)	45	47.9
Marital status	Married	84	89.4
	Widowed	6	6.4
	Divorced	4	4.3
Employment Status	Housewife	47	50.0
	Employee	47	50.0
Number of Children	1-2	62	66.0
	3-4	19	20.2
	≥ 5	13	13.8
Residence	Urban	6	6.4
	Suburban	80	85.1
	Rural	8	8.5

The demographic data of the mothers are presented in table 1, this table shows that the majority of the mothers subgroups are : those with ages ranging between (21-30) years (51.1%); those that have higher education (47.9%), those who are employee (89.4%), those who have (1-2) children (60%); those that live in suburban area (85%). Employment status is equally distributed into housewife (50%) and employee (50%).

Table 2. Statistical distribution (frequency and percentage) of the mothers' attitude towards completing the vaccination program.

Items	Sub-groups	Total = 94	
		Freq.	%
1. Are you adhering to the recommended vaccination schedule for your child/children?	Never	8	8.5
	Sometimes	40	42.6
	Always	46	48.9
2. If the answer is “sometimes” or “never,” what is the main reason for not completing the vaccination schedule?	Lack of awareness	7	7.4
	Difficulty accessing health care	60	63.8
	Health or cultural concerns	27	28.7
3. Is there a health center near your place of residence?	Never	8	8.5
	Sometimes	30	31.9
	Always	56	59.6
4. Do you receive reminders about your child's vaccinations?	Never	0	0.0
	Sometimes	32	34.0
	Always	33	35.1
5. Did the health center staff explain to you the importance of vaccinations?	Never	29	30.9
	Sometimes	0	0.0
	Always	25	26.6
6. Do you have cultural or social beliefs that	Never	37	39.4

prevent you from taking your child to the center for vaccination?	Sometimes	32	34.0
	Always	60	63.8
7. Do you usually have transportation to get to the health center?	Never	27	28.7
	Sometimes	7	7.4
	Always	25	26.6
8. In your opinion, is the quality of vaccines provided at the health center high?	Never	36	38.3
	Sometimes	33	35.1
	Always	11	11.7
9. Do you have other responsibilities that conflict with scheduled vaccinations?	Never	54	57.4
	Sometimes	29	30.9
	Always	24	25.5

It can be seen from Table 2 that the mothers' attitudes toward completing the vaccination program for their children consist of many factors that influence adherence. About 48.9% of mothers claim to follow the recommended schedule always, 42.6% only sometimes, and 8.5% never do it. The most significant barrier to completing vaccinations is the difficulty to access health care, with a percentage of 63.8%, followed by health or cultural concerns at 28.7%, and lack of knowledge at 7.4%. Even though 59.6% of respondents said there is a nearby health centre, accessibility is also an issue because transportation is available to only 26.6% of them always. Reminders are also not good for vaccinations, where 34.0% get reminders sometimes and 35.1% always. Also, 30.9% of mothers were never trained by health staff on the importance of vaccinations, which could be a factor in noncompliance. Cultural and social beliefs play a role, with 34.0% sometimes and 63.8% always having barriers in taking their children for immunization. This shows that there is a need for better healthcare access plus education in the community as well as constant reminders on vaccinations to mothers about adhering to vaccinations.

Table 3. Frequency and percentage of mothers' subgroups according to their attitude towards completing the vaccination program.

	Attitude Assessment		
	Weak	**Moderate**	**Good**
Frequency	11	54	29
Percentage	11.70	57.45	30.85

Table 3 is about percentage of mothers' subgroups according to their attitude towards completing the vaccination program, it shows that about (11.7%) of the mothers have weak attitude, (57.45 %) of them have moderate attitude, while (30.85 %) have good attitude.

Table 4. Association between the overall assessment of mothers' attitude towards completing the vaccination program and their demographic data.

Demographic data	**Chi Square**	**Df**	**P value**	**Sig.**
Age / years	1.28	4	0.86	NS
Educational Status	9.49	4	0.05	S
Marital status	7.94	6	0.24	NS
Employment Status	0.19	2	0.90	NS
Number of Children	3.48	4	0.48	NS
Residence	9.65	4	0.04	S

df= degree of freedom; NS : Non-significant at P value >0.05 ; HS : High Significant at P value <0.01

Concerning table 4 is about the association between the overall assessment of mothers' attitude towards completing the vaccination program and their demographic data, it shows that there is a non-significant association (P>0.05) between the overall assessment of mothers' attitude towards completing the vaccination program and their demographic data ; except educational level and residence in which

there was significant association (P<0.05) with mothers' attitude towards completing the vaccination program.

Discussion

Regarding maternal adherence to children's vaccinations in Jordan, the study's results reflect a high commitment to medical practices related to disease prevention and child health. The consistently high adherence score shows their dedication to ensuring their children's immunization against preventable diseases by vaccination, which is consistent with the findings of (Abor et al.2022). Our study findings confirmed the influence of demographic characteristics on maternal adherence to children's vaccinations in Jordan.

Moreover, our study revealed a significant positive correlation between mothers' ability to access and understand health information and their adherence to vaccination. This can be interpreted as mothers with a greater ability to access and understand health information being better equipped to interpret medical information, navigate healthcare resources, and critically assess vaccination benefits and risks (Ali, A. H., Abdullah,2020). There is a lack of research investigating this topic, which adds value to the current research. Clear and accessible communication strategies are essential for addressing disparities in knowledge based on mothers' ability to access and understand health information, as they enable mothers to make informed choices.

Education and taking time with patients have been shown to result in modest improvement in terms of affecting parents' attitudes about immunization, but the exact messages or tools for healthcare providers should use have not been fully discovered. Understanding the source of parents' questions can equip pharmacists, physicians, nurses, and other healthcare providers to speak with patients on a more relatable level and to speak to the areas parents value the most. All healthcare workers should make an effort to stay up to date on the recommended vaccines and to understand why those immunizations are recommended. This information will allow patients to have face-to-face access to reliable information that can help them to make the best decisions for their families (Williams SE,2013).

Household income and wealth index influences the likelihood that children receive complete immunization. This result is similar to the result of many previous studies that show that children from wealthier families are more likely to be immunized than children from poorer families (Badan Pusat Statistik. 2015). Although free vaccination services are offered in Indonesia, the time and financial cost of reaching health facilities can be an obstacle to parents. Furthermore, higher wealth index is associated with better health status and health-seeking practices.

The village health post program makes it easy for community members to access the immunization program. Good coordination between health centers and village health posts is an effective element in increasing the number of children who receive full immunization. In contrast, increasing the density of health centers showed a negative association with immunization status. The most plausible explanation for this is that mothers were likely to take their children to village health posts for immunization, as shown by the positive and significant relationship between higher density of village health posts and immunization status in this study. Providing accessible immunization services is thus crucial to raising immunization coverage (Adebayo BE).

Conclusion

In conclusion, the study sample comprised mostly mothers aged between 21-30 years, with a significant portion having higher education. The majority of the mothers were married and had 1-2 children. Half of the mothers were housewives, and half were employees. Most of the mothers reside in suburban areas. Regarding the mothers' attitudes towards completing the vaccination program for their children, about half reported always adhering to the schedule, while a significant portion sometimes adhered, and a small percentage never adhered. The most significant barrier to completing vaccinations was difficulty accessing healthcare. Overall, the mothers' attitude towards completing the vaccination program was moderate. Educational level and residence showed a significant association with the mothers' attitude

towards completing the vaccination program, while age, marital status, employment status, and number of children did not show a significant relationship. These findings highlight the need for interventions to improve healthcare access and promote vaccination adherence among mothers.

Recommendations

Based on the findings of this study, several recommendations can be made. First, developing and implementing tailored health education campaigns that focus on addressing knowledge gaps that target mothers with low income and educational levels.

Second, a robust monitoring and evaluation system should be established to continuously assess the impact of vaccination programs and initiatives. We need to regularly collect data on vaccination coverage and the barriers faced to refine strategies and ensure their effectiveness.

Third, the popularity of social media platforms should be leveraged to disseminate accurate information about vaccinations. Collaborate with influencers and health professionals to create engaging and informative content that can reach a wider audience.

Finally, ongoing training should be provided for healthcare professionals to ensure that they are equipped with the latest vaccination-related information and communication skills. This approach will enhance their ability to address parental concerns and provide evidence-based guidance.

Certain limitations should be acknowledged. This study adopted a cross-sectional design. Therefore, future longitudinal studies could track the evolution of these concepts over time or the response to changing health communication practices. The study relied on self-report surveys, which may be subject to bias. Another limitation is the use of social media in data collection which may lead to sampling bias. Social media users may not be representative of the general population, as they often differ in terms of demographics, behavior, and opinions. Moreover, some demographics may be interlinked requiring attention to possible confounding factors in future studies. Future research could incorporate mixed methods that involve combining surveys and in-depth interviews. Moreover, the scope of this study was limited to Najaf ; thus, replications of this study are encouraged to encompass a wider variety of geographic regions and cultural settings to provide a more comprehensive understanding of the topic.

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