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Immunization knowledge, attitudes, compliance, and barriers among parents of under-five children attending Al-Yarmouk Teaching Hospital, Baghdad

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Abstract
Introduction: Immunization is crucial for preventing infectious diseases in children under five, yet vaccination rates in Iraq are inconsistent due to socio-economic and cultural factors. This study investigates parental knowledge, attitudes, compliance, and barriers to immunization among parents of young children attending Al-Yarmouk Teaching Hospital in Baghdad.
Methods: A cross-sectional design was employed, targeting 300 parents of children aged 0-5. Participants were recruited through convenience sampling in the outpatient department. A structured questionnaire assessed knowledge, attitudes, compliance rates, and barriers to vaccination. Data analysis was conducted using SPSS software, employing descriptive statistics and chi-square tests to examine associations between variables.
Results: Among participants, 72% were mothers, predominantly aged 21-30 (62%). The sample revealed low levels of immunization knowledge: only 19% had good knowledge, while 63% adhered to vaccination schedules. Barriers to compliance included lack of awareness (35%) and family issues (32%). Despite a positive attitude towards vaccination, with 81% agreeing on its necessity, misconceptions—such as beliefs about vaccination for only the first child—persisted. Notably, informants without siblings exhibited higher knowledge rates. The findings highlight significant disparities in knowledge and compliance, influenced by demographic factors such as education, age, and residence. While the majority recognized vaccination's importance, misconceptions and logistical barriers hindered adherence. This underscores the need for targeted educational interventions tailored to specific demographics to enhance vaccination rates.
Conclusions: This study emphasizes the urgent need for strategies addressing knowledge gaps and compliance barriers. Future research should explore the effectiveness of educational programs and the role of cultural beliefs in shaping vaccination attitudes, aiming to improve public health strategies in Iraq and similar contexts.

Keywords: Immunization knowledge, parental attitudes, vaccination compliance, barriers to immunization, child health in Iraq

Introduction

Immunization plays a critical role in preventing infectious diseases among children, particularly those under five years of age. According to the World Health Organization (WHO), vaccination coverage is essential for achieving herd immunity and preventing outbreaks of vaccine-preventable diseases [1]. In Iraq, immunization rates have fluctuated due to various socio-economic and cultural factors, leading to concerns about the health outcomes for children [2]. Prior studies have identified knowledge, attitudes, and practices surrounding immunization as key determinants influencing compliance [3]. Despite these insights, there remains a significant gap in understanding how parental perceptions and barriers affect vaccination rates in Baghdad, necessitating further investigation.

The research problem this study addresses is the lack of comprehensive data regarding the knowledge, attitudes, compliance, and barriers to immunization among parents of under-five children at Al-Yarmouk Teaching Hospital, Baghdad. Existing literature highlights that misconceptions and lack of information significantly hinder vaccination compliance [4]. However, localized studies exploring the unique challenges faced by parents in this region are limited. This research aims to fill this gap, providing insights that could inform public health strategies.

The rationale for this study lies in its potential to impact health policies and practices aimed at improving immunization rates. By understanding the barriers and facilitators to immunization from the parents' perspective, health authorities can design targeted interventions to enhance knowledge and compliance [5]. Furthermore, the findings may contribute to the broader discourse on child health in the Middle East, highlighting the need for culturally sensitive approaches to vaccination campaigns.

A review of relevant literature indicates that while several studies have explored immunization compliance globally, few have specifically addressed the nuances of parental knowledge and attitudes in the context of Iraq [6, 7]. For instance, research in neighboring countries has shown that educational interventions significantly improve vaccination rates [8]. However, these findings have not been fully explored in the Iraqi context, creating an opportunity for this study to contribute new insights.

This study will focus on parents of children under five years attending the Al-Yarmouk Teaching Hospital, examining variables such as knowledge levels, attitudes towards vaccines, compliance rates, and perceived barriers. Potential limitations include a focus on a single hospital, which may not represent the broader population, and reliance on self-reported data, which can introduce bias [9].

The study objectives

1. Assess the knowledge and attitudes of parents regarding immunization.
2. Evaluate the compliance rates with vaccination schedules
3. Identify barriers to immunization; and Provide recommendations for improving immunization uptake among under-five children in Baghdad.

Methodology

Study Design: This study employed a cross-sectional design to assess immunization knowledge, attitudes, compliance, and barriers among parents of under-five children.

Setting and timing: The research was conducted at outpatient clinic of Al-Yarmouk Teaching Hospital in Baghdad, Iraq. Data collection occurred over a period of three months, from January to March 2024.

Sample population and size*:* The study targeted parents of children aged 0 to 5 years who attended the hospital. Participants included both male and female parents. Inclusion criteria comprised parents who were the primary caregivers of children in the specified age range and provided informed consent. Exclusion criteria involved parents who were unable to communicate effectively due to language barriers or cognitive impairments. The sample size was determined to be 300 participants, calculated based on a power analysis with an expected prevalence of immunization knowledge at 50%, a margin of error of 5%, and a confidence level of 95%.

Sampling method: A convenience sampling technique was employed to recruit participants. Parents were approached in the outpatient department of the hospital during their visits. Participants were invited to voluntarily participate in the study after receiving an explanation of its purpose.

Data collection methods: Data were gathered using a structured questionnaire specifically designed to evaluate parents' knowledge, attitudes, compliance, and barriers related to immunization. This questionnaire included multiple-choice and Likert-scale items. The validity of the instrument was confirmed through expert reviews, while reliability was assessed in a pilot study.

Data analysis: Statistical analysis was carried out using SPSS software (version 26). Descriptive statistics, including frequencies, percentages, and visual representations such as tables and figures, were utilized to summarize participant characteristics, knowledge, attitudes, compliance rates, and identified barriers. Chi-square tests were performed to explore associations between variables.

Official and ethical approvals: All official approvals and ethical clearances were obtained prior to the initiation of the study, ensuring compliance with institutional and national research regulations. The ethics committee of Al-Yarmouk Teaching Hospital granted approval, and informed consent was obtained from all participants before data collection. This process ensured that participants were fully aware of their rights and the study's objectives.

Results

Table 1 presents the demographic characteristics of informants and children in the study population of 300 participants. Among the informants, mothers constituted the majority at 72% (n=216), while fathers made up 28% (n=84). The age distribution reveals that the largest group of informants was aged 21–30 years, representing 62% (n=186), followed by 24% (n=72) in the 31–40 years category. Regarding residence, 55% (n=165) lived in rural areas, and 45% (n=135) in urban settings. In terms of education, 39% (n=117) of informants were graduates or above, while 25% (n=75) had only primary school education. Occupationally, 55% (n=165) were unemployed or house wife, with 28% (n=84) in government or private employment. The family monthly income indicated a predominance of low-income households, with 60% (n=180) earning 750,000 ID or less. Gender-wise, slightly more children were female (53%, n=159) than male (47%, n=141), and most children were toddlers aged 1–3 years (43%, n=129). Sibling composition showed that 39% (n=117) of children had no siblings, and 38% (n=114) had one sibling.

Table 1: Demographic Characteristics of Informants and Children in the Study Population

Variables	Frequency (n=300)	Percentage (%)
Informant		
mother	216	(72.0)
father	84	(28.0)
Age of informant		
≤ 20 years	24	(08.0)
21–30 years	186	(62.0)
31–40 years	72	(24.0)
>40 years	18	(06.0)
Residence		
rural	165	(55.0)
urban	135	(45.0)
Educational status of the informant		
illiterate & Primary school	75	(25.0)
intermediate & secondary school	108	(36.0)
graduate & above	117	(39.0)
Occupational status		
unemployed & house wife	165	(55.0)

govt./private employed	84	(28.0)
self-employed	51	(17.0)
Family monthly income (IDs)		
low (750,000 ID or Less)	180	(60.0)
medium (750,000- 1500,000 ID)	90	(30.0)
high (above 1500.000 ID)	30	(10.0)
Gender of child		
male	141	(47.0)
female	159	(53.0)
Age of child		
Infant (0–1 yr.)	75	(25.0)
Toddler (1–3 yrs.)	129	(43.0)
Pre-school (3-5 yrs.)	96	(32.0)
Number of sibling		
zero	117	(39.0)
one	114	(38.0)
two	45	(15.0)
three	24	(8.0)

In Table 2, the knowledge levels and immunization compliance among participants were assessed, revealing significant disparities. Among 300 participants, only 19% (n=57) demonstrated good knowledge (mean score: 10.9 ± 0.8), while a majority, 60% (n=180), had fair knowledge (mean score: 8.4 ± 1.6), and 21% (n=63) exhibited poor knowledge (mean score: 3.2 ± 0.6). The differences in knowledge levels were statistically significant (p=0.001). Regarding immunization compliance, 63% (n=189) adhered to vaccination schedules (mean score: 9.8 ± 2.1), contrasting with 37% (n=101) who did not follow the schedule (mean score: 8.4 ± 3.2), with this difference also being significant (p=0.013). These results indicate a concerning prevalence of inadequate knowledge and highlight the need for interventions to improve understanding and compliance with immunization schedules.

Table 2: Mean scores and significance of knowledge levels and immunization compliance among participants

Variables	N. (%) 300 (100.0)	Scores Mean ± SD	P value
Level of Knowledge (range)			
Good (11–15)	57 (19.0)	10.9 ± 0.8	0.001
Fair (6–10)	180 (60.0)	8.4 ± 1.6	
Poor (0–5)	63 (21.0)	3.2 ± 0.6	
Compliance of immunization			
Vaccination not done as per schedule	111 (37.0%)	8.4 ± 3.2	0.013
Vaccination done as per schedule	189 (63.0%)	9.8 ± 2.1	

Table 3 presents participants' attitudes toward childhood vaccination, highlighting significant consensus on several key points. A striking 81.0% strongly agree that vaccination is compulsory, while 75.0% believe it should begin soon after birth. Moreover, 62.0% perceive vaccinations as more beneficial than harmful, indicating a positive overall attitude towards the importance of immunization. However, concerns arise regarding perceived side effects; 57.0% express neutrality or disagreement about severe side effects, suggesting some uncertainty in this area. Additionally, 36.0% of participants strongly disagree with the notion that vaccination is prohibited in certain religions, indicating a general acceptance of vaccination across cultural beliefs. Notably, 61.0% believe only the first baby should receive vaccinations, reflecting misconceptions that could impact immunization practices. Despite these concerns, a majority—61.0%—agree that vaccines should be administered according to schedule, reinforcing the necessity of timely vaccinations. Overall, the data suggests a predominantly favorable attitude toward childhood vaccination, tempered by some skepticism regarding side effects and misconceptions about the necessity of vaccination for all children.

Table 3: Participants' attitudes towards childhood vaccination

Items	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Vaccination of the child is compulsory	243 (81.0)	36 (12.0)	12 (4.0)	6 (2.0)	3 (1.0)
Vaccination should be initiated soon after birth	225 (75.0)	42 (14.0)	21 (7.0)	9 (3.0)	3 (1.0)
Vaccination is more beneficial than harmful	186 (62.0)	90 (30.0)	15 (5.0)	9 (3.0)	6 (2.0)
Vaccination is associated with severe side effects	69 (23.0)	102 (34.0)	57 (19.0)	60 (20.0)	12 (4.0)
Vaccination is prohibited in certain societies	11(5.5)	19 (9.5)	29(14.5)	69 (34.5)	72 (36.0)
Only the first baby needs vaccinations.	6 (2.0)	9 (3.0)	12 (4.0)	90 (30.0)	183 (61.0)
Male children should receive all vaccines than female child	18 (6.0)	21 (7.0)	42 (14.5)	96 (32.5)	123 (41.0)
Child may get infection from the vaccination,	45 (15.0)	39 (13.0)	75 (25.0)	75 (25.0)	66 (22.0)

instead prevention					
Vaccines should be given as per schedule	183 (61.0)	87 (29.0)	15 (5.0)	12 (4.0)	3 (1.0)
It is important to give all the vaccines	192 (64.0)	105 (35.0)	24 (8.0)	6 (2.0)	3 (1.0)

The non-compliance to the vaccination as per schedule was 69 (23.0%).several factors contribute to missed vaccination doses, as revealed by the data. The most common reason, cited by 35% of respondents, was a lack of awareness about the need to return for subsequent doses. Family issues accounted for 32% of missed doses, while 31% of individuals reported that vaccines were not available at the immunization centers. Additionally, 25% of participants noted that their child was ill at the time of vaccination.

Geographic challenges were also significant, with 20% stating that the immunization center was too far from their home. Long wait times were a barrier for 15%, and 12% found the immunization schedule inconvenient. Financial constraints affected 9%, as they could not afford travel expenses. Concerns about side effects were reported by 7%, and 6% mentioned the inability to take leave from work as a reason for missing their vaccination. (Figure1)

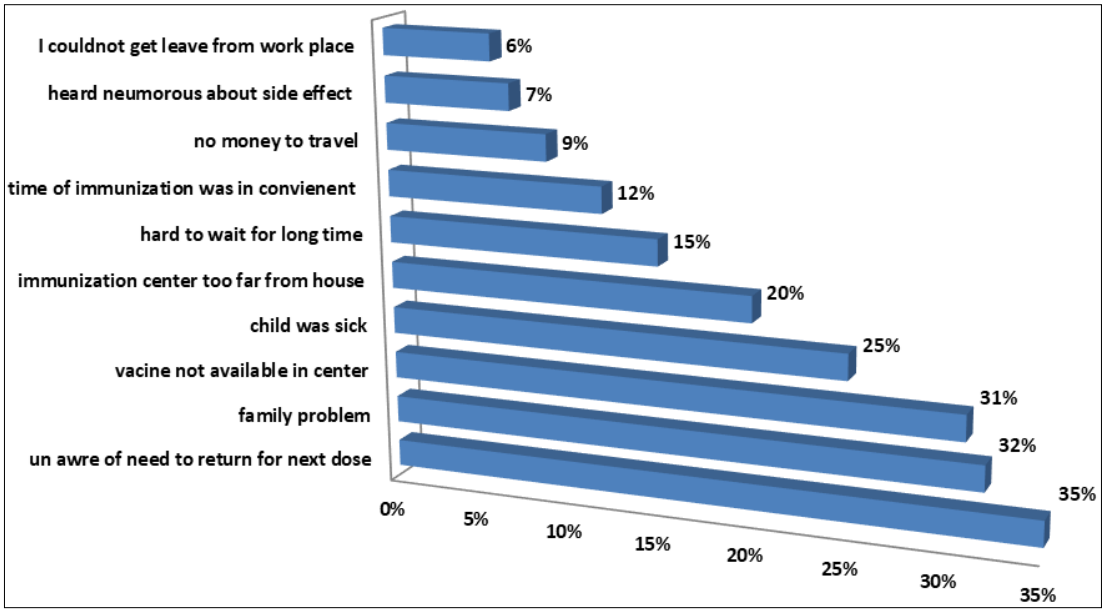

Fig 1: Barrier of complete vaccination

The distribution of knowledge levels among informants based on various child and informant variables reveals significant differences across several categories. In total, 300 informants participated, with only 19.0% (57) exhibiting good knowledge, 60.0% (180) fair knowledge, and 21.0% (63) poor knowledge. Notably, mothers demonstrated higher knowledge levels compared to fathers (good: 59.6% vs. 40.4%, p=0.001). Age also played a critical role; informants aged 21-30 years had the highest good knowledge rate at 70.2%, while those ≤ 20 years reported no good knowledge (p=0.001). Informants from rural areas (59.6%) showed better knowledge than those from urban settings (40.4%, p=0.001). Educational status was significant, with graduates showing the highest poor knowledge at 73.0% (p=0.001). Unemployed and housewives had the highest good knowledge (57.9%), while a significant percentage of families with low income had fair knowledge (59.4%, p=0.002). Gender of the child and age showed no significant correlation with knowledge levels, but the number of siblings significantly affected knowledge, with informants having zero siblings displaying the highest good knowledge (42.2%, p=0.001). Overall, knowledge levels were significantly influenced by informant characteristics, with education, residence, and informant type being the most impactful factors. (Table 4)

Table 4: Distribution of Knowledge Levels Based on Various Informant and Child Variables

Variables	Knowledge level			Total	P-value
	Good 57 (19.0)	Fair 180 (60.0)	Poor 63 (21.0)	300 (100.0)	
Informant					
mother	34 (59.6)	152 (84.4)	30 (47.6)	216 (72.0)	0.001
father	23 (40.4)	28 (15.6)	33 (52.4)	84 (28.0)	
Age of informant					
≤ 20 years	0 (0.0)	4 (2.2)	20 (31.7)	24 (08.0)	0.001
21– 30 years	40 (70.2)	133 (73.9)	13 (20.6)	186 (62.0)	
31– 40 years	9 (15.8)	38 (21.1)	25 (39.7)	72 (24.0)	
> 40 years	8 (14.0)	5 (2.8)	5 (7.9)	18 (06.0)	
Residence					
rural	34 (59.6)	110 (61.1)	21 (33.3)	165 (55.0)	0.001

urban	23 (40.4)	70 (38.9)	42 (66.7)	135 (45.0)	
Educational status of the informant					
illiterate & Primary school	7 (12.3)	54 (30.0)	14 (22.2)	75 (25.0)	0.001
intermediate & secondary school	23 (40.3)	82 (45.6)	3 (4.8)	108 (36.0)	
graduate & above	27 (47.4)	44 (24.4)	46 (73.0)	117 (39.0)	
Occupational status					
unemployed & house wife	33 (57.9)	118 (65.6)	14 (22.2)	165 (55.0)	0.001
govt./private employed	15 (26.3)	38 (21.1)	31(49.2)	84 (28.0)	
self-employed	9 (15.8)	24 (13.3)	18(28.6)	51 (17.0)	
Family monthly income (IDs)					
low (750,000 ID or Less)	35 (60.8)	107 (59.4)	38 (60.3)	180 (60.0)	0.002
medium (750,000- 1500,000 ID)	15 (26.7)	50 (27.8)	25 (39.7)	90 (30.0)	
high (above 1500.000 ID)	7 (12.3)	23 (12.8)	0(0.0)	30 (10.0)	
Gender of child					
male	30 (52.6)	85 (47.2)	26 (41.3)	141 (47.0)	0.211
female	27 (47.4)	95 (52.8)	37 (58.7)	159 (53.0)	
Age of child					
Infant (0–1 yr.)	15 (26.3)	42 (23.4)	18 (28.6)	75 (25.0)	0.346
Toddler (1–3 yrs.)	23 (40.4)	80 (44.4)	26 (41.2)	129 (43.0)	
Pre-school (3-5 yrs.)	19 (33.3)	58 (32.2)	19 (30.2)	96 (32.0)	
Number of sibling					
zero	24 (42.2)	81 (45.0)	12 (19.0)	117 (39.0)	0.001
one	21 (36.8)	67 (37.2)	26 (41.3)	114 (38.0)	
two	6 (10.5)	21 (11.7)	18 (28.6)	45 (15.0)	
three	6 (10.5)	10 (5.6)	8(12.7)	24 (8.0)	

Table 5 presents the compliance rates based on demographic and socioeconomic variables in the study indicate several significant trends. Overall, 63.0% of respondents complied with the schedule, with notable differences based on informant type (p = 0.034), where mothers reported 76.2% compliance compared to 23.8% from fathers. Age of informants showed a strong correlation with compliance (p = 0.001), with the 21–30 age group exhibiting 71.9% compliance. Residence significantly affected compliance (p = 0.001), as 64.0% in rural areas complied compared to 36.0% in urban areas. Educational status was crucial (p = 0.001), with 46.0% compliance among those with intermediate education. Occupational status also impacted compliance rates (p = 0.001), with 71.0% compliance among unemployed or housewives. Family income levels correlated significantly with compliance (p = 0.001), showing 68.2% compliance in low-income families. Gender of the child influenced compliance (p = 0.007), with higher compliance for males (52.9%). Lastly, the number of siblings was significantly related to compliance (p = 0.001), as those with no siblings had a compliance rate of 46.5%. Overall, the data highlights key demographic factors associated with compliance, underscoring the importance of targeted interventions in varying contexts.

Table 5: Distribution of compliance rates by demographic and socioeconomic variables

Variables	**Compliance as per schedule**		**Total 300 (100.0)**	**P- value**
	Yes 189 (63.0)	**No 111 (37.0)**		
Informant				
mother	144 (76.2)	72 (64.9)	216 (72.0)	0.034
father	45 (23.8)	39 (35.1)	84 (28.0)	
Age of informant				
≤ 20 years	9 (4.8)	15 (13.5)	24 (08.0)	0.001
21–30 years	136 (71.9)	50 (45.1)	186 (62.0)	
31–40 years	36 (19.0)	36 (32.4)	72 (24.0)	
>40 years	8 (4.3)	10 (9.0)	18 (06.0)	
Residence				
rural	121 (64.0)	44 (39.6)	165 (55.0)	0.001
urban	68 (36.0)	67 (60.4)	135 (45.0)	
Educational status of the informant				
illiterate & Primary school	42 (22.2)	33 (29.7)	75 (25.0)	0.001
intermediate & secondary school	87 (46.0)	21 (18.9)	108 (36.0)	
graduate & above	60 (31.8)	57 (51.4)	117 (39.0)	
Occupational status				
unemployed & house wife	134 (71.0)	31 (28.0)	165 (55.0)	0.001
govt./private employed	36 (19.0)	48 (43.2)	84 (28.0)	
self-employed	19 (10.0)	32 (28.8)	51 (17.0)	
Family monthly income (IDs)				
low (750,000 ID or Less)	129 (68.2)	51 (46.0)	180 (60.0)	0.001
medium (750,000- 1500,000 ID)	47 (24.9)	43 (38.7)	90 (30.0)	
high (above 1500.000 ID)	13 (6.9)	17 (15.3)	30 (10.0)	
Gender of child				

male	100 (52.9)	41 (37.0)	141 (47.0)	0.007
female	89 (47.1)	70 (63.0)	159 (53.0)	
Age of child				
Infant (0–1 yr.)	49 (26.0)	26 (23.4)	75 (25.0)	0.027
Toddler (1–3 yrs.)	88 (46.5)	41 (37.0)	129 (43.0)	
Pre-school (3-5 yrs.)	52 (27.5)	44 (39.6)	96 (32.0)	
Number of sibling				
zero	88 (46.5)	29 (26.2)	117 (39.0)	0.001
one	64 (33.9)	50 (45.0)	114 (38.0)	
two	20 (10.6)	25 (22.5)	45 (15.0)	
three	17 (9.0)	7 (6.3)	24 (8.0)	

Discussion

The demographic characteristics of the informants in this study reveal important insights into the background of families participating in childhood immunization programs. A significant majority of informants were mothers (72%), with a predominant age group being 21–30 years (62%). This is consistent with the findings of Mulugeta *et al*. (2021) [10], which highlight that mothers frequently serve as the primary decision-makers in their children's healthcare, especially regarding immunizations. Additionally, the educational status of informants is noteworthy, with nearly 39% being graduates or above. This level of education has been positively correlated with health literacy and improved health outcomes in children (Osman *et al*., 2022) [11].

Our findings indicate that a considerable portion of the informants lived in rural areas (55%) and belonged to low-income households (60% earning 750,000 ID or less). Previous studies suggest that socioeconomic status significantly impacts access to healthcare services, including immunization [12]. The barriers prevalent in rural settings may help explain the discrepancies in knowledge levels and immunization compliance observed in this study. For instance, participants from rural areas demonstrated higher knowledge levels compared to their urban counterparts, possibly due to community health initiatives targeting rural populations (Salim *et al*., 2023) [13].

The findings related to and immunization compliance are particularly concerning. Only 19% of participants exhibited good knowledge regarding vaccination, while 60% showed fair knowledge, indicating a critical need for educational interventions. These results are consistent with those of Chao *et al*. (2020) [14], who found that a lack of knowledge among parents significantly hindered vaccination compliance. Moreover, the statistically significances in knowledge levels based on the age and gender of informants highlight the necessity for tailored educational approaches, especially targeting younger mothers and fathers [15].

Despite the majority of participants recognize the importance of vaccination, as evidenced by the high percentage (81%) agreeing that vaccination is compulsory, a notable 37% of respondents did not adhere to vaccination schedules. The barriers to compliance identified, including lack of awareness (35%) and family issues (32%) underscore the complexity of vaccination adherence. These barriers resonate with findings from studies conducted in similar contexts, suggesting that multi-faceted interventions are needed to address both knowledge gaps and logistical issues surrounding immunization (Khan *et al*., 2023) [16].

The participants exhibited predominantly positive attitudes toward vaccination, with most acknowledging its importance and supporting adherence to vaccination schedules. However, misconceptions—such as the belief that only the first child should receive vaccinations and concerns about side effects—highlight areas that require further education and targeted public health messaging. Similar misconceptions have been documented in various studies, indicating a widespread issue across different populations (Hassan *et al*., 2023) [17].

The impact of sibling composition on knowledge levels is particularly intriguing. Informants without siblings demonstrated the highest rates of good knowledge, indicating that family structure may influence how knowledge is shared and understood within households. This finding aligns with Anderson J. (2014) [18], who suggested that parental experience with multiple children can enhance awareness and engagement in health-related issues.

Conclusions

This study highlights significant disparities in knowledge and immunization compliance among the 300 participants, revealing that only 19% possessed good knowledge while 63% adhered to vaccination schedules. The findings underscore the importance of informant characteristics—such as education, age, and residence—in influencing both knowledge levels and compliance rates, particularly noting that mothers and younger informants exhibited higher knowledge and compliance. Despite a generally favorable attitude toward vaccination, concerns about side effects and misconceptions regarding the necessity of vaccinations for all children persist. These insights emphasize the urgent need for targeted educational interventions to improve understanding and compliance with immunization schedules. For future research, it would be valuable to explore the impact of specific educational programs on knowledge and compliance, investigate the underlying reasons for non-compliance in depth, and assess how cultural beliefs affect vaccination attitudes across diverse communities. Addressing these areas can provide a more comprehensive understanding and enhance public health strategies.

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