



E-ISSN: 3006-3159

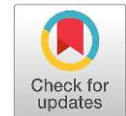


Assessment of Knowledge and Attitude of Parents Toward Child Immunization in Tobruk, Libya

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Volume: 7

Issue: 1

Page Number: 74 - 83

Keywords:

Childhood Immunization, Parental Knowledge, Vaccine Attitude, Vaccine Hesitancy, Tobruk, Libya

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Received: 20/07/2026

Accepted: 31/07/2026

Published: 01/08/2026

<https://doi.org/10.71147/mnvcer72>



ABSTRACT

Background: Routine childhood immunization is one of the most cost-effective public health interventions for reducing pediatric morbidity and mortality. Parental knowledge and attitudes are pivotal determinants of vaccination compliance and schedule adherence.

Objectives: This study aimed to assess parental knowledge and attitudes regarding childhood immunization in Tobruk, Libya, and to examine their association with sociodemographic variables.

Methods: A cross-sectional facility-based study was conducted from May to September 2025 in two primary healthcare centers (Bab Derna Clinic and Al Manara Clinic). A total of 390 parents of children aged 0–5 years attending routine vaccination visits were interviewed using a validated structured questionnaire. Data were analyzed using SPSS version 21, with Chi-square tests (χ^2) applied and statistical significance set at $p < 0.05$. **Results:** Of the 390 participants, 58.7% were female, 74.6% were younger than 40 years, 71.3% resided in urban areas, and 49.2% held a university degree. High knowledge was observed regarding disease. High knowledge was observed regarding disease prevention (89.0%) and the birth dose schedule (79.7%). However, gaps persisted: only 41.5% understood the need for multiple doses, 37.2% recognized the safety of concomitant administration, and 62.8% held misconceptions about false contraindications. Attitudes were overwhelmingly positive, with 98.7% affirming vaccine importance. Significant associations were found with maternal gender, younger age, higher education, urban residence, and higher parity. **Conclusion:** Despite strong acceptance, targeted educational interventions are needed to address knowledge deficits, particularly among fathers, rural residents, and lower literacy groups.

1. INTRODUCTION

Immunization remains one of the most cost-effective public health interventions, preventing millions of deaths annually from vaccine-preventable diseases worldwide. Routine childhood vaccination programs have led to dramatic declines in morbidity and mortality from diseases such as diphtheria, measles, polio, and pertussis, and they continue to constitute a cornerstone of child survival strategies and national health agendas (World Health Organization [WHO], 2025).

According to the most recent estimates from the WHO and the United Nations Children's Fund (UNICEF), global coverage with three doses of diphtheria-tetanus-pertussis (DTP3) vaccine was 85% in 2024, representing approximately 109 million infants protected. However, an estimated 14.3 million children remain "zero-dose" children who have never received a single dose of any vaccine, and an additional 5.6 million are partially vaccinated, highlighting persistent inequities in immunization access (Alhattab, 2025). The Immunization Agenda 2030 (IA2030), adopted by the World Health Assembly in 2020, establishes an ambitious global vision for vaccines and immunization for the decade 2021-2030, aiming to reduce vaccine-preventable deaths, expand vaccine access, and strengthen immunization within primary health care frameworks (WHO, 2021). Despite these ambitious targets, the IA2030 Global Progress Report 2024 indicates that the estimated number of future deaths averted by immunization in 2023 reached 4.19 million, which was 9.3% below the annual target, translating to an additional 430,000 preventable future deaths (WHO, 2024). Furthermore, the number of zero-dose children increased to 14.5 million in 2023 from 13.9 million in 2022, indicating insufficient progress in engaging more children in immunization programs. These data underscore the urgent need for context-specific research to identify and address barriers to vaccination in underserved populations and conflict-affected settings (Pong et al., 2025). Despite significant reductions in the incidence of vaccine-preventable diseases, substantial heterogeneity in vaccination coverage persists globally, and considerable proportions of children continue to experience delayed or incomplete vaccination schedules. This phenomenon represents a critical public health risk, as it threatens the resurgence of infectious diseases that were previously under control and facilitates the reintroduction of diseases that had been eliminated (de Cantuária Tauil et al., 2016). Recent analyses from the WHO have demonstrated that a substantial proportion of children globally fail to access immunization services or complete their immunization schedules, attributable to systemic weaknesses in health service delivery, inadequate public awareness, and the proliferation of fears and misconceptions regarding vaccine safety and efficacy (WHO, 2020). A substantial body of evidence has demonstrated that childhood vaccination status is influenced by a complex interplay of factors operating at multiple levels, including child-level characteristics, parental attitudes and knowledge, the social context of the family, and the accessibility and quality of healthcare services (Kawakatsu & Honda, 2012). Among these determinants, parental knowledge, attitudes, and practices (KAP) have emerged as particularly influential predictors of vaccine uptake, given that parents serve as the primary decision-makers regarding whether children receive routine immunizations (Balgovind & Mohammadnezhad, 2022). Parents' knowledge of vaccine-preventable diseases, their attitudes toward immunization, and their perceptions of vaccine safety and efficacy substantially shape their decisions to vaccinate their children, delay vaccination, or refuse vaccines altogether. In this context, low levels of parental KAP have been consistently associated with elevated risks of vaccine hesitation, postponement, and refusal, thereby compromising herd immunity and increasing population vulnerability to vaccine-preventable disease outbreaks (Zastawna et al., 2023). Empirical evidence from contexts comparable to Libya has consistently demonstrated significant associations between parental KAP indicators and childhood vaccination coverage. A recent study conducted in Ethiopia found that higher levels of parental education and comprehensive knowledge of infant vaccinations were significantly associated with improved vaccination rates in children (Gebreyesus et al., 2021). Similarly, research in Canada identified sociodemographic factors such as lower household income and larger family size as predictors of greater parental hesitation and refusal to vaccinate (Schellenberg et al., 2023). In the Middle East and North Africa (MENA) region, a cross-sectional study conducted in Nalut, Libya, between December 2022 and July 2023, found that while the overall level of misconceptions about vaccinations was low among participants, 56.80% demonstrated positive attitudes toward vaccination practices, and significant associations were identified between vaccination attitudes and educational level (Al-Mabrouk et al., 2025). These findings suggest that targeted educational interventions may be effective in improving vaccination outcomes in Libyan populations. Despite the critical importance of understanding parental decision-making in the context of Libya, research examining the specific determinants of childhood vaccination in this setting remains limited. Therefore, the present study aims to examine how parental knowledge, attitudes, and practices influence children's vaccination rates in Libya by identifying different levels of knowledge, beliefs, and practices that impact vaccination coverage.

2. METHOD

A cross-sectional study was conducted in primary health centers (Bab Derna Clinic and Al-Manara Clinic) in Tobruk, Libya. All parents of children aged 0–5 years who attended primary health centers for routine childhood vaccination visits from May to September 2025 were enrolled.

Inclusion criteria: Parents of children aged 0–5 years who attended the selected primary health centers for routine childhood vaccination during the study period.

Exclusion criteria: Children who attended the primary health centers for immunization accompanied by relatives other than their parents were excluded.

Data were collected through face-to-face interviews, and responses were recorded in a structured questionnaire. Verbal informed consent was obtained from each participant prior to data collection.

Sample size: All parents who attended the selected primary health centers for routine childhood vaccination during the study period were enrolled (n = 390).

The questionnaire was adapted from a previously published and validated questionnaire used in prior studies on parental knowledge and attitudes toward childhood immunization (Yousif et al., 2013). The questionnaire was composed of three main sections: parental demographics, parental knowledge, and parental attitudes toward childhood immunization. Parental demographics included gender, age, residence (urban or rural), educational level, and number of children. Responses to knowledge questions were recorded as "Yes," "No," or "Don't know." A five-point Likert scale ("Strongly agree," "Agree," "Not sure," "Disagree," and "Strongly disagree") was used to assess parents' attitudes toward childhood immunization.

3. ETHIC APPROVAL

Ethical approval for the study was granted by the Research Office of the Faculty of Medicine, University of Tobruk (Ethical approval number NBC :009. H.25.37).

4. RESULT

Table 1: Parents' Demographics (N = 390)

Table 1: Parents' Demographics (N = 390) Background Characteristic	Frequency (n)	Percentage (%)
Gender: Male	161	41.3
Gender: Female	229	58.7
Age Groups: 18-29	110	28.2
Age Groups: 30-39	181	46.4
Age Groups: 40-49	65	16.7
Age Groups: 50 & above	34	8.7
Residence: Urban	278	71.3
Residence: Rural	112	28.7
Educational Level: University	192	49.2
Educational Level: Secondary	117	30.0
Educational Level: Primary	54	13.8
Educational Level: Illiterate	27	6.9
Number of Children: One	61	15.6
Number of Children: 2-3	152	39.0
Number of Children: More than 3	177	45.4

Table 2: Knowledge on Childhood Immunization Correlated to Parents' Demographics

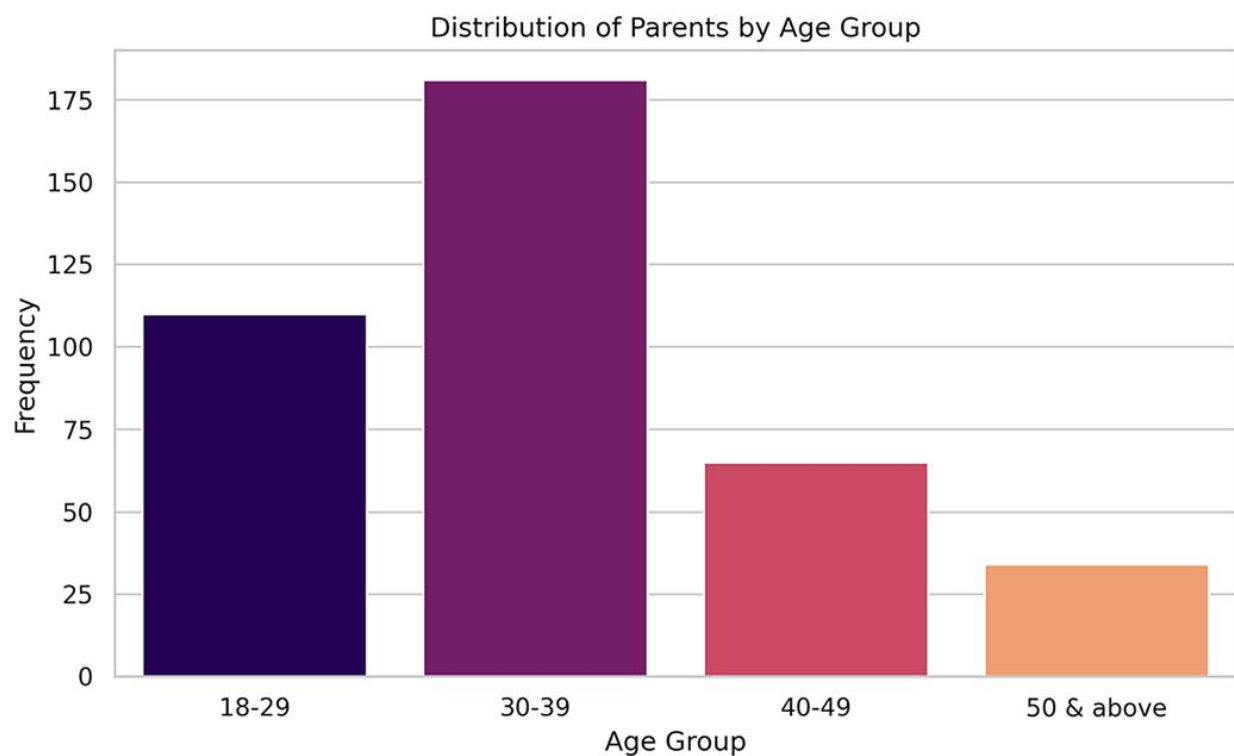
Item	Yes	No	Don't Know	Significance and p-value
Routine vaccination prevents children from some infectious diseases and complications	347 (89.0%)	16 (4.1%)	27 (6.9%)	Not significant
First dose in vaccination given at birth	311 (79.7%)	35 (9.0%)	44 (11.3%)	Gender (p=0.017), Age (p<0.001), Residence (p<0.001), Education (p<0.001)
Most diseases against which children are vaccinated occur during the first years of life	287 (73.6%)	45 (11.5%)	58 (14.9%)	Residence (p=0.048), Education (p=0.017)
Multi-doses of the same vaccine given at intervals are important for child immunity	162 (41.5%)	135 (34.6%)	93 (23.8%)	Gender (p=0.019), Education (p=0.004)
More than one vaccine at the same time has no negative impacts on child immunity	145 (37.2%)	143 (36.7%)	102 (26.2%)	Gender (p=0.024)
Is it important to vaccinate children during immunization campaigns	270 (69.2%)	65 (16.7%)	55 (14.1%)	Not significant
It is recommended to vaccinate children against seasonal influenza	178 (45.6%)	98 (25.1%)	114 (29.2%)	Age (p=0.016), Residence (p=0.005), Education (p=0.011)
Immunization can cause autism	61 (15.6%)	269 (69.0%)	60 (15.4%)	Age (p=0.009), Residence (p=0.001), Education (p=0.013)
Common colds, ear infection, and diarrhea are not contraindications for vaccination	145 (37.2%)	153 (39.2%)	92 (23.6%)	Gender (p<0.001)

Table 3: Parents' Attitudes Towards Childhood Immunization

Item	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Child immunization is important	334 (85.6%)	51 (13.1%)	3 (0.8%)	1 (0.3%)	1 (0.3%)
Immunization is more beneficial than harmful	235 (60.3%)	133 (34.1%)	15 (3.8%)	6 (1.5%)	1 (0.3%)
Vaccines for child immunization are safe	153 (39.2%)	147 (37.7%)	68 (17.4%)	17 (4.4%)	5 (1.3%)
Child immunization is prohibited in religion	9 (2.3%)	13 (3.3%)	46 (11.8%)	118 (30.3%)	204 (52.3%)
Immunization associated with side effects	61 (15.6%)	149 (38.2%)	117 (30.0%)	48 (12.3%)	15 (3.8%)
Child can become infected after immunization	31 (7.9%)	76 (19.5%)	153 (39.2%)	93 (23.8%)	37 (9.5%)
Compliance to immunization schedule is important	255 (65.4%)	110 (28.2%)	18 (4.6%)	5 (1.3%)	2 (0.5%)
Immunization keeps your child healthy	248 (63.6%)	122 (31.3%)	15 (3.8%)	3 (0.8%)	2 (0.5%)

Table 4: Association Between Attitudes on Childhood Immunization and Parents' Educational Level

Attitude Statement	University (n=192)	Secondary (n=117)	Primary (n=54)	Illiterate (n=27)	p-value
Child immunization is important: - Strongly Agree/Agree - Not Sure/Disagree/Strongly Disagree	98.4% 1.6%	97.4% 2.6%	96.3% 3.7%	85.2% 14.8%	0.002
Immunization is more beneficial than harmful: - Strongly Agree/Agree - Not Sure/Disagree/Strongly Disagree	96.4% 3.6%	93.2% 6.8%	88.9% 11.1%	81.5% 18.5%	0.007
Child immunization is prohibited in religion: - Strongly Agree/Agree - Not Sure/Disagree/Strongly Disagree	4.7% 95.3%	5.1% 94.9%	5.6% 94.4%	11.1% 88.9%	0.044
Child can become infected after immunization: - Strongly Agree/Agree - Not Sure/Disagree/Strongly Disagree	28.6% 71.4%	25.6% 74.4%	31.5% 68.5%	33.3% 66.7%	0.015
Compliance to immunization schedule is important: - Strongly Agree/Agree - Not Sure/Disagree/Strongly Disagree	94.8% 5.2%	93.2% 6.8%	88.9% 11.1%	77.8% 22.2%	0.003
Immunization keeps your child healthy: - Strongly Agree/Agree - Not Sure/Disagree/Strongly Disagree	96.9% 3.1%	95.7% 4.3%	90.7% 9.3%	81.5% 18.5%	0.011

**Figure 1: Distribution of Parents by Age Group**

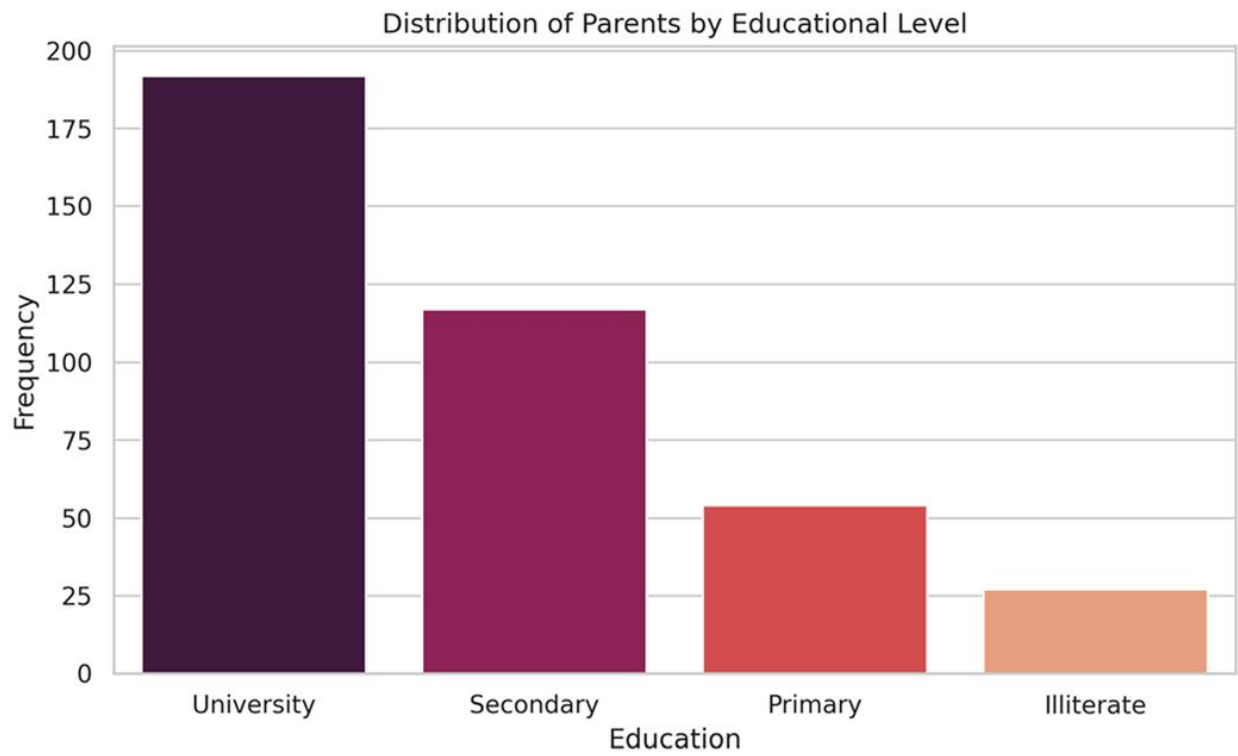


Figure 2: Distribution of Parents by Educational Level

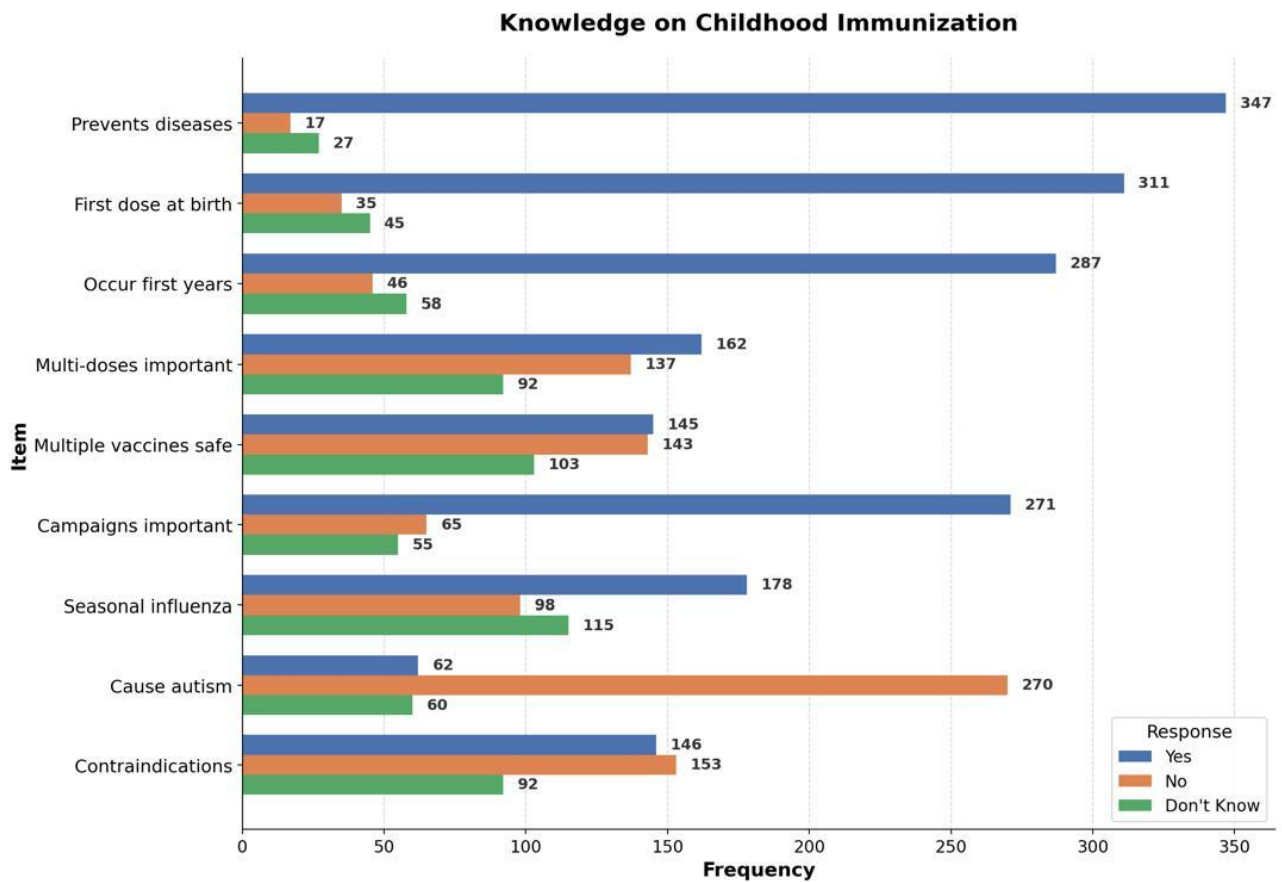


Figure 3: Parents' Knowledge on Childhood Immunization

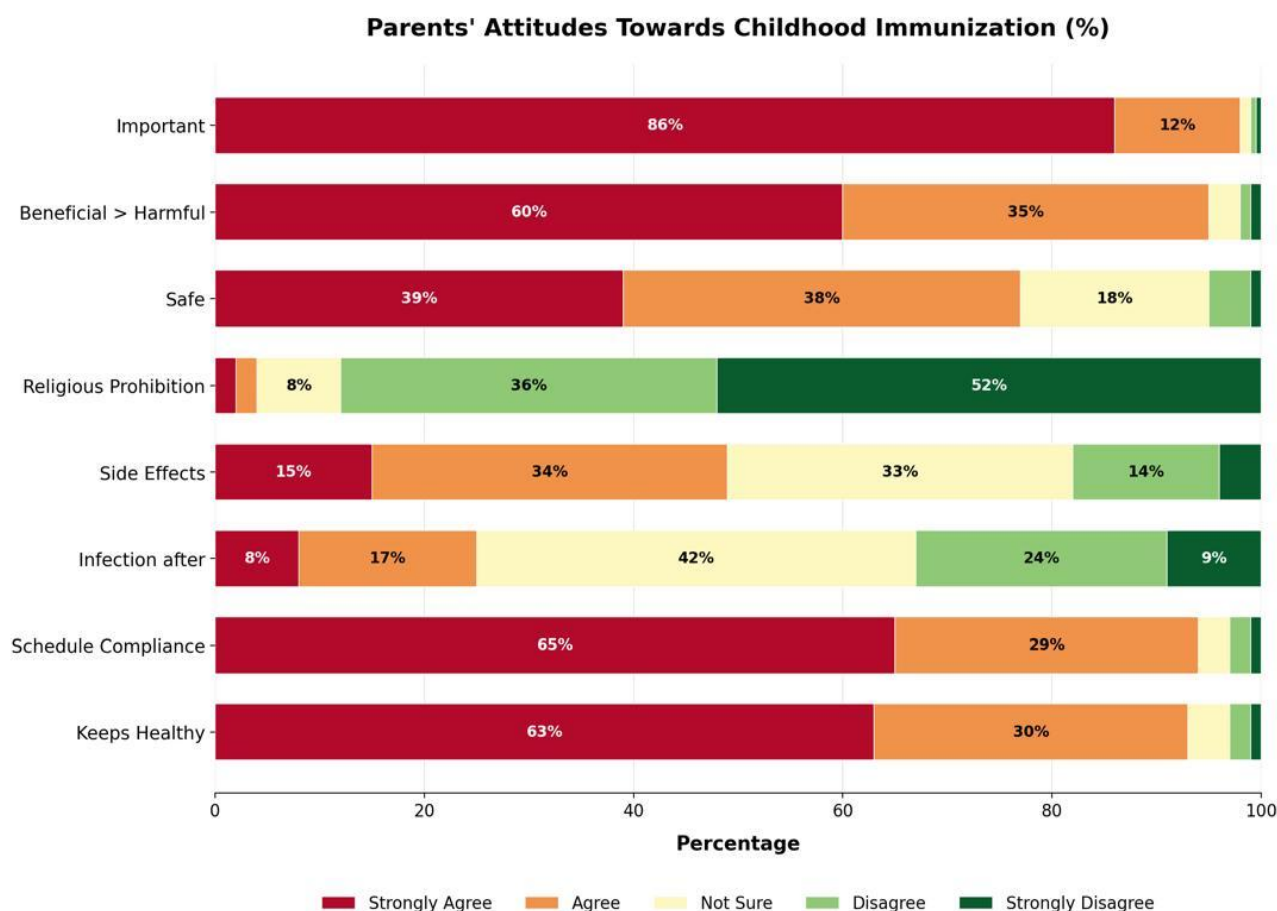


Figure 4: Parents' Attitudes Towards Childhood Immunization

5. DISCUSSION

The present study examined parental knowledge and attitudes toward childhood immunization among a sample of 390 parents, and explored associations between these variables and key sociodemographic characteristics including gender, age, educational level, residence, and number of children.

About half of the parents had higher education, this may be explained by the fact that the majority of the participants were living in the town where they were originally born and had better chances to complete their higher education.

A considerable proportion of parents demonstrated awareness of fundamental immunization principles. Specifically, 89.0% recognized that routine vaccination protects children from infectious diseases and their complications, and 79.7% were aware that the first dose of the vaccination schedule is administered at birth. Our results agree with study done in Baghdad, Iraq from October 30, 2023 to May 2, 2024 and consistent with another study conducted in August–September 2020 with parents who applied to the Well Child Outpatient Clinic of Ankara City Hospital Children's Hospital which reported that most parents had good knowledge regarding the importance and benefits of routine childhood immunization (Salih et al., 2025; Yüksel & Uzun Kara, 2021).

However, these findings differ from another cross-sectional study was conducted at Family Health Centers in the city of Mardin in the Southeastern Anatolia Region of Turkey, between January and March 2022 who found that A total of 32.0% of the parents were found to be hesitant about vaccinations and 3.4% did not have at least one vaccination for their children (Bayram Değer & Yiğitalp, 2024).

A notable deficit in knowledge were observed as Less than half of parents (41.5%) understood the rationale for administering multiple doses of the same vaccine, and only 37.2% correctly recognized that concurrent administration of multiple vaccines does not adversely affect child immunity. Our findings are in line with those reported in previous study done by Wallace AS et al Wallace et al. (2014).

Furthermore, 62.8% of parents either incorrectly identified or were uncertain whether common childhood illnesses such as colds, ear infections, and diarrhea constitute contraindications for vaccination, a finding with direct implications for vaccine uptake, as unnecessary postponement of immunization during mild illness represents a missed opportunity for protection. The same results of a study done in Saudi Arabia and China more than two-thirds of parents believed that low-grade fever, common cold, and diarrhea are vaccination contraindications (Nassar et al., 2023; Liu et al., 2017).

In our research, we found that 69.0% of parents correctly rejected a causal link between immunization and autism is encouraging; these results are in line with a cross-sectional survey conducted by the Royal Children's Hospital in Melbourne, Australia, where 69% of parents rejected the vaccine-autism causal link (Royal Children's Hospital, 2023).

University-educated parents were significantly more likely to possess accurate knowledge across immunization domains compared to those with primary or no formal education; also Urban residence was similarly associated with higher knowledge levels ($\chi^2 = 15.82$, $p = 0.004$), consistent with the well-established pattern that urban populations benefit from greater proximity to healthcare facilities, broader access to media and health information campaigns, and more frequent interactions with healthcare providers, these results agree with study of 360 parents in Turkey found that 58.0% of urban parents had high vaccine knowledge compared to only 22.2% of rural parents (Evrans & Bozkurt, 2022).

Another finding in our study was a significant gender effect ($\chi^2 = 6.27$, $p = 0.019$), with female parents demonstrating higher immunization knowledge than their male counterparts. Our results are in line with a previous cross-sectional survey conducted between February and April 2024 in a sample of parents of adolescents attending middle and high schools in Southern Italy, which demonstrate female parents had 2.56 times higher odds of having correct knowledge about adolescent vaccinations than male parents (Paduano et al., 2024). This finding may reflect the traditionally greater caregiving role assumed by mothers, resulting in more frequent engagement with pediatric healthcare services and correspondingly greater exposure to immunization-related information.

Our present study demonstrated generally positive parental attitudes toward childhood immunization. Almost all participants (98.7%) agreed that childhood immunization is important, while 94.4% believed that the benefits of vaccination outweigh its potential risks. Furthermore, 76.9% considered vaccines safe, 86.4% agreed that childhood immunization is not prohibited by religion, 93.6% emphasized the importance of adhering to the recommended immunization schedule, and 94.9% agreed that immunization helps maintain children's health. These findings indicate a high level of parental acceptance of childhood vaccination despite the presence of some concerns regarding vaccine safety and adverse effects.

6. CONCLUSION

The present study evaluated parents' knowledge and attitudes toward childhood immunization among 390 parents. The findings showed that although parents had satisfactory knowledge regarding the basic principles and benefits of childhood immunization, important knowledge gaps remained regarding multiple-dose vaccination schedules, simultaneous administration of vaccines, seasonal influenza vaccination, vaccine contraindications, and misconceptions linking vaccines to autism.

Overall, parents demonstrated positive attitudes toward childhood immunization, with the majority recognizing the importance of vaccination, its benefits, and the necessity of adhering to the recommended immunization schedule. Nevertheless, concerns regarding vaccine safety and possible side effects were still reported by a proportion of parents, indicating the persistence of vaccine hesitancy among some participants.

The study also demonstrated that parental knowledge and attitudes were significantly associated with several sociodemographic characteristics. Female parents, younger parents, university-educated parents, urban residents, and parents with more children had significantly higher knowledge levels and more positive attitudes toward childhood immunization compared with their counterparts.

These findings emphasize the importance of strengthening parental education and addressing misconceptions through evidence-based health communication.

Improving parents' understanding of childhood immunization is expected to increase vaccine confidence, promote adherence to vaccination schedules, and ultimately improve childhood immunization coverage.

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