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Knowledge, Attitudes, and Practices of Parents toward Vaccination of Children Under Six Years in Aden, Yemen

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ABSTRACT

Background: Vaccine hesitancy has emerged as a growing public health concern globally, particularly in low-resource and conflict-affected settings such as Yemen. Caregivers' knowledge, attitudes, and practices (KAP) play a crucial role in childhood immunization uptake. Objective: This case report aimed to present a case of uterine perforation and bowel prolapse following an unsafe induced abortion.
Objective: This study aimed to assess caregivers' KAP toward routine childhood vaccination in Aden, Yemen, and identify barriers influencing vaccination decisions.
Methods: A descriptive, cross-sectional study was conducted in six districts of Aden from April 23 to May 20, 2025. A total of 277 participants were selected using simple random sampling. Data were collected using a validated, structured questionnaire and analyzed with SPSS version 26. Descriptive statistics and Chi-square tests were used to assess associations between variables.
Results: Of the 277 participants, 88.45% reported vaccinating their children. Higher educational level ($p = 0.034$) and better knowledge of vaccine-related symptoms ($p < 0.001$) were significantly associated with vaccination uptake. No significant association was found between caregiver age and vaccination status ($p = 0.433$). Fever (40.2%) was the most common post-vaccination symptom. While most caregivers did not report specific barriers, fear of unfamiliar vaccination campaigns was the most cited concern.
Conclusion: the findings highlight a strong link between caregivers' education and knowledge with vaccine acceptance. Addressing misinformation and promoting community-specific education are critical to improving immunization rates in Aden.

Keywords: Vaccine Hesitancy, Aden, Yemen, Vaccination

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INTRODUCTION

Vaccine hesitancy is considered one of the most pressing global health concerns, contributing to the resurgence of vaccine-preventable diseases among children. The COVID-19 pandemic has played a significant role in affecting parents' confidence in vaccination [1]. The World Health Organization defines it as the delay in accepting or refusing vaccines despite their availability [2]. This problem has also reverberated across the Middle East and North Africa, with several Muslim-majority countries experiencing an increase in the incidence of vaccine-preventable diseases [3]. In 2015, Egypt recorded nearly 5,000 children infected with measles [4]. In other words, the problem of refusing vaccinations has begun to affect both developing and high-income countries alike. [5,6]. A 2022 study in Yemen showed that parents' hesitation contributes to the decrease in the demand for vaccination [7].

In Yemen, there are several factors involved in making parents hesitating or abstaining from immunization and include low income, poor health system, limited economic resources and a difficult geographical environment [7,8]. Therefore, this study aimed to assess parents' knowledge, attitudes, and practices (KAP) toward vaccinating their children under the age of six.

METHODS

Study Design

This study is a descriptive, cross-sectional, community- based study.

Study Setting and Duration

Data were collected between April 23 and May 20, 2025, in six districts of Aden: Al-Mualla, Al-Tawahi, Al-Mansoura, Al-Buraiqah, Al-Khisa, and Salah Al-Din. Approximately 15 primary healthcare centers serve the study areas, providing basic health services including routine childhood immunizations. These facilities were accessible to the target population during the data collection period. According to recent estimates, the population of Aden Governorate in 2025 is approximately 1,150,000.

Sample Size and Sampling Technique

The calculated sample size was 377; however, due to logistical challenges, only 277 participants were included. A total of 277 participants were selected using simple random sampling. The sample size was estimated based on population density and ease of access in each district.

Inclusion and Exclusion Criteria

Inclusion Criteria

Families residing in Aden with children under the age of 6 and those who consent to participate.

Exclusion Criteria

Families with children older than 6, those not residing in Aden, and those who declined participation.

Data Collection Tools

A standardized, pre-tested structured questionnaire was used to collect the data, divided into three sections: Demographic information of the caregiver and child, access to vaccination services and caregiver's perception and attitudes toward vaccination.

Data Analysis

Data was cleaned, validated and analyzed using SPSS v 26. Descriptive statistics (frequencies, percentages) and analytical test (Chi-square) was used. Data were considered significant if P value is ≤0.05.

Ethical Considerations

Approval was obtained from local Population and Health Office. Written informed consent was secured from participants, who were assured of voluntary participation and the right to withdraw at any time.

RESULTS

The study included 277 participants. The majority of caregivers were parents (79.4%), and more than half of the respondents were male (55.2%). Most participants were aged between 25–34 years (35.4%). Regarding education, 32.9% held a university degree, while 9.7% were illiterate (Table 1).

There was a statistically significant association between the child's vaccination status and the caregiver's educational level of the caregiver ($p = 0.034$), indicating that children of caregivers with higher education were more likely to be vaccinated (Table 2). A highly significant association was found between caregivers' knowledge of vaccine symptoms and their children receive the vaccine ($p < 0.001$

(Table 2). The analysis showed no statistically significant association between the caregiver's age group and whether the child received the vaccine (p = 0.433) or not. This suggests that the caregiver's age does not appear to influence the likelihood of child vaccination (Table 2). Table 3 is showing the frequency and relationships of difficulties that the caregiver faces for each region. Figure 1 showing the vaccination status of the children involved in this study with 88.45% being vaccinated. Regarding the symptoms following vaccination, fever was the most commonly reported (40.2%), followed by redness at the injection site (13.1%) (Figure2). Regarding the reasons preventing caregivers from vaccinating their children, the majority reported no reasons. The next most common reason was fear of unknown vaccination campaigns (Figure 3).

Table 1: Frequency of socio-demographic characteristics of study participants in Aden, 2025, (n=277)

Characteristic	Variable	Frequency	%
Gender	Male	153	**55.2**
	Female	124	**44.8**
Age distribution (Years)	18-24	21	**7.6**
	25-34	98	**35.4**
	35-44	92	**33.2**
	Over 45	49	**17.7**
Level of education	Illiterate	27	**9.7**
	Basic education	51	**18.4**
	Secondary education	99	**35.7**
	Higher education	91	**32.9**
Relation to the child	Parent	220	**79.4**
	Grandparent	20	**7.2**
	Other	37	**13.4**

Table 2: The relationship between vaccine status of children and the education level, age group of the caregiver and awareness about the associated adverse symptoms. Aden – Yemen, 2025, (n=277)

Characteristic	Variable	Vaccination status			P value
		Yes n(%)	No n(%)	Uncertain n(%)	
Educational level of caregiver	Illiterate	25(10.5%)	1 (3.6%)	1 (100%)	0.034
	Basic	48(20.1%)	3 (10.7%)	0 (.00%)	
	Secondary	84(35.1%)	15(53.6%)	0 (.00%)	
	College and above	82(34.3%)	9 (32.1%)	0 (.00%)	
Age group of caregivers	18-24	18 (7.9%)	3 (10%)	0 (.00%)	0.433
	25-34	81(35.4%)	17(56.7%)	0 (.00%)	
	35-44	85(37.1%)	6 (20%)	1 (100%)	
	≥ 45	44(19.2%)	4 (13.3%)	0 (.00%)	
The knowledge of the caregiver about the symptoms of vaccine	Yes	228(82.31%)	19(6.86%)	0 (.00%)	0.0003
	No	16 (11.1%)	9 (3.25%)	1 (0.36%)	

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Table 3: The frequency and relationships of difficulties that the caregiver faces for each region. Aden – Yemen, 2025, (n=277)

Variables	Categories	Degree of difficulty for vaccination center										P-value
		No difficulty		Yes, always		Yes, sometimes		Yes, rarely		Not applicable		
		N	%	N	%	N	%	N	%	N	%	
Locations	AL- Mualla	25	13%	4	17.4%	9	29%	3	60%	4	15.4%	0.0003
	AL- Tawahi	71	37%	12	52.2%	14	45.2%	1	20%	7	26.9%	
	AL- Mansura	51	26.6%	6	26.1%	6	19.4%	1	20%	2	7.7%	
	AL- Burega	20	10.4%	1	4.30%	2	6.5%	0	0.00%	1	3.8%	
	AL- Khisah	15	7.8%	0	0.00%	0	0.00%	0	0.00%	8	30.8%	
	Salahuddin	10	5.2%	0	0.00%	0	0.00%	0	0.00%	4	15.4%	

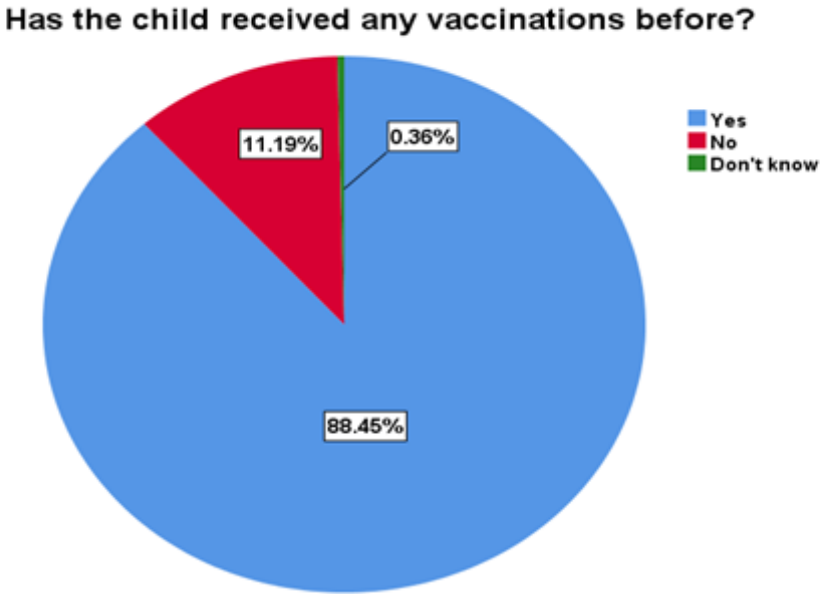

Figure 1: The vaccination status of children involved in study, Aden – Yemen 2025

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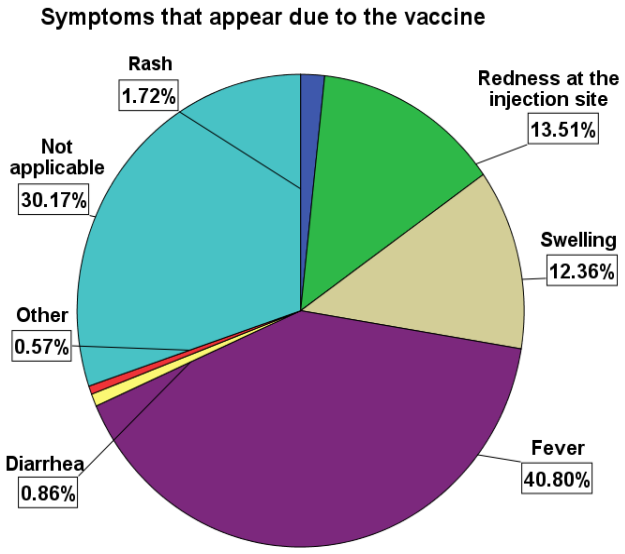

Figure 2: The most common symptoms associated with vaccination among children in Aden-Yemen 2025

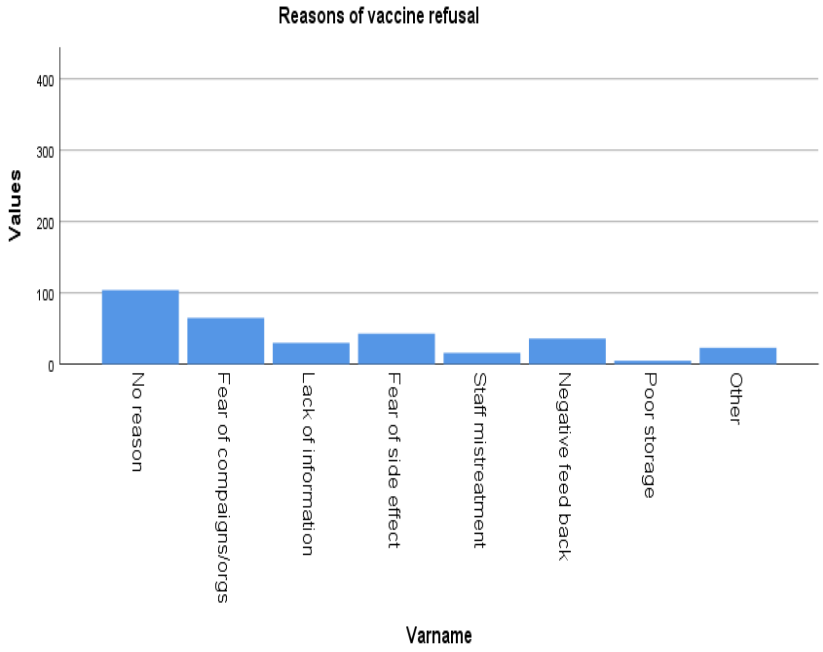

Figure 3: The most common reasons for refusal of vaccination among parents, Aden- Yemen 2025

DISCUSSION

Hepatitis B virus (HBV) infection poses a major health problem worldwide, with about a third of the world's population showing seropositivity as a result of current or previous infections (9). The hepatitis B vaccine is still one of the most successful interventions in neonatal care, and early vaccination has been shown to greatly reduce vertical transmission (10). The immunization against measles is affordable, safe, and efficient. Measles can be eradicated from a population entirely; however, this needs 93% to 95% of the population to receive two doses of the vaccine (11). This study revealed a high childhood vaccination rate among

participants in Aden, with 88.45% reporting their children had received vaccines, which is consistent with findings from Hadhramout, Yemen, where parental knowledge and trust in healthcare systems were found to influence vaccine uptake [7]. The significant association between caregiver education and vaccination status also mirrors observations in Saudi Arabia, where higher parental education was linked to increased vaccine acceptance [5]. Fear of unknown vaccination campaigns was the most reported reason for vaccine refusal among those who did not vaccinate their children, echoing concerns documented across the MENA region, where misinformation and distrust in public health initiatives have led to vaccine hesitancy despite availability [4].

The current study also showed that caregivers with better knowledge of vaccine-related symptoms were more likely to vaccinate their children, a finding that aligns with global research linking accurate knowledge and vaccine confidence [1]. Although most participants did not report specific barriers to vaccination, there are inter-region variation in difficulties even in the same city, emphasizing the need for localized strategies and educational campaigns and accessibility issues. In fragile health systems like Yemen's, rebuilding public trust through transparent communication is crucial to improving immunization rates [8].

This study faced several limitations, including time constraints, which limited the duration available for data collection. Additionally, the sample size was slightly smaller than the originally calculated sample due to access challenges. Data were collected only from specific neighborhoods in Aden, which may not fully represent the entire city, and communication was occasionally difficult due to the use of unfamiliar terms among some participants. There were also financial challenges related to transportation across different districts. Despite these limitations; however, the study has important strength points. It is novel and community-based in nature, providing direct insights from caregivers on the ground. Its originality lies in exploring real-world experiences of vaccination behavior and barriers in a specific local context that has rarely been studied.

CONCLUSION

The study highlights a high rate of childhood vaccination among participants. Education level and knowledge of vaccine-related symptoms were significantly associated with vaccination status, underlining the importance of awareness and educational interventions. Although most caregivers did not report clear barriers, regional data reveal varying challenges, with fear of unfamiliar vaccination campaigns emerging as the most frequently reported concern. These findings underscore the need for targeted health education, community-specific strategies, and transparent communication to strengthen public trust and improve vaccine uptake.

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Conflicts of Interest

The authors declare that they have no conflict of interest.

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