Knowledge, Attitudes, and Barriers to the Utilization of Optional Vaccines Among Mothers of Children Under Five Years of Age in Kheda District, Gujarat

ABSTRACT:

Introduction: Vaccination is an effective and a reliable method to safeguard oneself from dangerous diseases before encountering them. Vaccination remains one of the most effective public health interventions in human history, significantly reducing the burden of infectious diseases and saving countless lives worldwide. **Aim:** To determine knowledge and attitude regarding optional vaccines and barriers to use among mothers of under five children in Kheda district **Methodology:** The non-experimental Descriptive Survey Research design used for this study. The study was conducted on 384 mothers of under five children from selected areas of Kheda district by non-probability purposive sampling technique. For the data collection researcher has prepared and used knowledge questionnaire, Attitude scale and to assess the barrier checklist questionnaire. **Result:** 240 (63%) of mothers have low knowledge, 123 (32%) have moderate knowledge, and 21 (5%) have good knowledge regarding optional vaccination. When 1 (0.3%) mother have Unfavourable attitude, 275 (71.6%) have moderate attitude, and 108 (28.1%) have favourable attitude towards optional vaccination. The mean score of attitude is 8.7083. The Correlation-Coefficient (r) of knowledge and attitude is 0.76. **Conclusion:** The study highlights the disparity between knowledge and attitude regarding optional vaccination among mothers of under five children. Although the majority lack adequate knowledge, a considerable number still maintain a moderate attitude. This emphasizes the need for targeted interventions to improve understanding and promote positive attitudes toward optional vaccination.

KEYWORDS: Knowledge, Attitude, Optional vaccination, Under-five children, Utilization and Barriers

INTRODUCTION

Vaccination is a preventive and reliable method to safeguard oneself from dangerous diseases before encountering them [1]. Vaccination is one of the most important and affordable ways the medical field has helped protect people from serious diseases, especially in reducing child deaths in developing countries like India. Parents' understanding is crucial in ensuring their children's good health [2]. Immunization plays a key role in improving child survival rates and reducing the impact of infectious diseases. It is an effective, low-cost method to save children's lives and prevent serious communicable illnesses [3,4]. To ensure maximum protection against diseases, children must receive all vaccinations on time and as per the recommended schedule. According to UNICEF, 14 million infants missed vaccinations in 2019, and 2–3 million deaths could have been avoided with timely immunization [5].

Globally, vaccination programs have significantly reduced infant mortality rates, dropping from 65 deaths per 1,000 live births in 1999 to 29 deaths per 1,000 live births in 2018 [6]. Over the past two decades, child health indicators in India have also shown considerable improvement. However, infectious diseases still contribute significantly to child illness and death. In India, nearly one million children under five die each year, with pneumonia and diarrheal diseases being the leading causes of death in one out of four cases[6].

While vaccination has successfully reduced infant mortality in high-income countries, only 65% of children in India receive full immunization during their first year of life. To

achieve 100% vaccination coverage and prevent dropouts, vaccines need to be given on time according to the National Immunization Schedule [7].

The success of immunization programs largely depends on mothers' knowledge and attitudes. Common barriers to vaccination in India and other countries include a lack of awareness, cultural myths, fear of side effects, religious beliefs, limited healthcare facilities, the gender of the child, and the child being unwell [8]. Therefore, it is essential to understand parents' knowledge, attitudes, practices, and challenges regarding complete immunization in the selected district of Uttarakhand [9].

Vaccination remains one of the most effective public health interventions in human history, significantly reducing the burden of infectious diseases and saving countless lives worldwide. However, the issue of optional vaccination has sparked considerable debate in recent years, with discussions revolving around personal choice, public health responsibilities, and the balance between individual freedoms and community protection [10, 11,12].

Optional vaccines, also known as elective or non-mandatory vaccines, are a topic of considerable debate and discussion in public health and policy circles. Unlike mandatory vaccines that are required by law for certain groups or for attending school, optional vaccines are recommended by health authorities but are not compulsory. This essay explores the concept of optional vaccines, their significance, controversies surrounding them, and their implications for public health [11].

Optional vaccines encompass a range of immunizations that are not universally mandated but are recommended based on individual risk factors, age, lifestyle, or occupation. These vaccines often target diseases that may not pose a significant public health threat in all circumstances but could be detrimental to specific populations. Examples include vaccines for diseases like HPV (Human Papillomavirus), meningococcal disease, and hepatitis A and B [13].

Moreover, optional vaccines can play a crucial role in protecting vulnerable populations. For instance, vaccines against diseases like influenza are recommended for certain groups such as the elderly and those with compromised immune systems. By choosing to vaccinate, individuals not only protect themselves but also contribute to herd immunity, reducing the overall transmission of infectious diseases within communities [13].

OBJECTIVE

- To assess the knowledge regarding the optional vaccines and barriers to use it among the mothers of under five children.
- To assess the attitude regarding optional vaccines and barriers for use among mothers of under five children.
- To assess the significant association between level of knowledge, attitude score and their selected demographic variables.

METHODS

This descriptive study was conducted after institutional ethical committee approval. A pre-validated knowledge questionnaire tool, Likert attitude scale And Barrier Questionnaire regarding optional vaccine was circulated to 384 Mothers of under-five children from selected village of Kheda district by using non probability purposive sampling technique from 25/06/2024 to 01/07/2024. Written informed consent was obtained from all participants along with assent form.

For knowledge questionnaire tool regarding optional vaccination, the total minimum score was 0 and total maximum score was 18. The cut off score and category was calculated as 14-18 indicate good knowledge, 9-13 indicate average knowledge and below 9 indicate poor knowledge regarding optional vaccination. For Likert attitude scale regarding optional vaccination, the total minimum score was 10 and total maximum score was 30. The cut off score and category was calculated as 23-30 indicate favourable attitude, 15-22 indicating moderate attitude and below 15 indicate unfavorable attitude regarding optional vaccination. The mothers were included from Salun Village, Dist.: Kheda. Data of both components were distributed in percentage based on mother’s age, child’s age, religion, type of family, mother’s education, father’s education family monthly income, source of immunization. Descriptive and

inferential statistic methods were used for the data analysis of the study. The **Chi-square test (χ^2)** was used to determine the association between the variables in this study.

Ethical Considerations:

Ethical considerations for this study included obtaining approval from the principal and the institute's ethical committee. Full names and affiliations of all Ethics Committees / Institutional Review Boards that ruled on ethics of your study.: **Maganbhai Adenwala Mahagujarat University Ethics Committee. The Study was Approved by the Ethical Committee reference number: MAM Uni/IECHR/2024/52.** Informed consent was obtained from all participants, who were fully informed that their participation was entirely voluntary.

RESULTS:

Table 1: Dimorphic variable of the participants (n=384)

Demographic Variable	Frequency	Percentage
Age of Mother:		
18-25 years	126	32.83%
25-30 years	175	45.57%
30-35 years	60	15.62%
Above 35	23	5.98%
Age of Child		
0-6 months	45	11.72%
6 months- 1year	110	28.65%
1-3 years	119	30.98%
3-5 years	110	28.65%
Religion		
Hindu	352	91.66%
Christian	25	6.51%
Muslim	7	1.83%
Other	0	0%
Type of Family		
Nuclear	150	39.06%
Joint	234	60.94%
Other	0	0%
Education of Mother		
No formal Education	48	12.50%
Primary Education	145	37.76%
Secondary Education	109	28.39%
Graduate & above	82	21.35%
Education of Father		
No formal Education	24	6.29%
Primary Education	113	29.35%
Secondary Education	128	33.37%
Graduate & above	119	30.99%
Monthly Family Income		
< ₹10,000	160	41.67%
₹10,001-₹20,000	103	26.82%
₹20,001-₹30,000	71	18.48%
>₹30,000	50	13.03%
Source of Immunization information		
Healthcare Provider	214	55.73%
Family/Friends	27	7.03%
Internet	34	8.85%
Television/Radio	6	1.56%
Govt. Health Campaign	81	21.10%
Other	22	5.73%
Has your child received any optional vaccine?		
Yes	44	11.45%
No	340	88.55%

Demographic key findings of the study:

In terms of mothers' age, the majority (45.57%) were between 25.1–30 years, with fewer (5.98%) above 35 years. Regarding children's age, most were between 1–3 years (30.98%), followed closely by 6 months–1 year (28.65%). In terms of religion, the majority were Hindu (91.66%), with smaller proportions identifying as Christian (6.51%) or Muslim (1.83%). Regarding family type, 60.94% belonged to joint families, while 39.06% were from nuclear families. In terms of education, most mothers had primary education (37.76%), while fathers showed slightly higher education levels, with 30.99% being graduates or above. Monthly family income revealed that 41.67% earned less than ₹10,000, whereas only 13.03% earned more than ₹30,000. The primary source of immunization information was healthcare providers (55.73%), followed by government health campaigns (21.10%). However, only 11.45% of children had received optional vaccines, highlighting the need for targeted awareness and education initiatives.

Table-2: Frequency and distribution of level of knowledge and attitude regarding optional vaccines among mothers of under five children.

Knowledge		Attitude	
Poor	240 (63%)	Unfavorable	1 (0.3%)
Average	123 (32%)	Moderate	275 (71.6%)
Good	21 (5%)	Favorable	108 (28.1%)

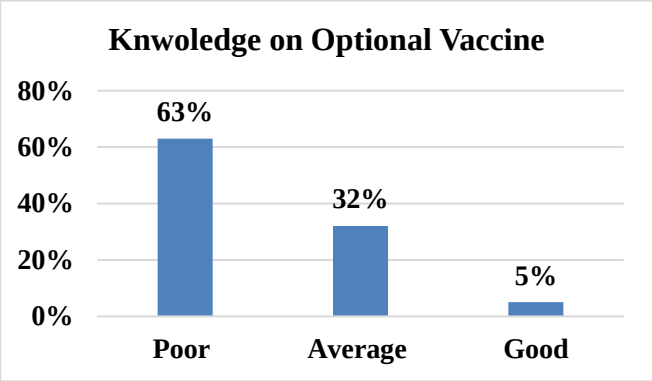
Table 2 presents the frequency and distribution of knowledge and attitude levels regarding optional vaccines among mothers of under-five children. Regarding knowledge, the majority (63%) had poor knowledge, 32% demonstrated an average level, and only 5% had good knowledge. In terms of attitude, most mothers (71.6%)

exhibited a moderate attitude, while 28.1% had a favorable attitude, and a minimal proportion (0.3%) displayed an unfavorable attitude. These findings highlight the need to improve both knowledge and attitudes toward optional vaccines among this population.

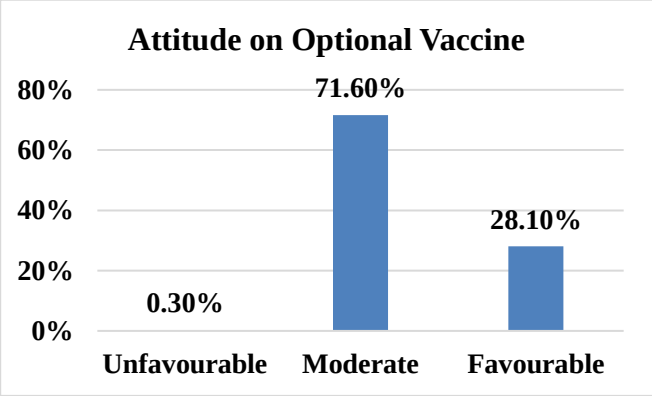
Table-3: Range, Mean and Standard Deviation for Level of Knowledge and Level of Attitude.

Mean and SD	Range	Mean	SD
Knowledge Score	15	8.70	2.91
Attitude Score	13	21.1	2.25

Table 3 highlights the range, mean, and standard deviation for levels of knowledge and attitude regarding optional vaccines among mothers. The knowledge scores ranged up to 15, with a mean score of 8.70 and a standard deviation (SD) of 2.91. Similarly, the attitude scores had a range of 13, with a higher mean of 21.1 and a lower SD of 2.25. These statistics indicate a relatively moderate variability in both knowledge and attitude levels among the participants.



Graph:1 Level of knowledge on optional Vaccine among Mothers



Graph:2 Level of knowledge on optional Vaccine among Mothers

Table-4: Correlation between Knowledge and Attitude regarding optional vaccines among mothers of under five children. (n=384)

Correlation	R score
Knowledge	0.76 S
Attitude	

Table 4 illustrates the correlation between knowledge and attitude regarding optional vaccines among 384 mothers of under-five children. The analysis reveals a strong positive correlation (r = 0.76) between the two variables, which was statistically significant. This indicates that higher knowledge about optional vaccines among mothers were associated with a more positive attitude towards them, emphasizing the need for effective educational programs to improve awareness and foster favorable attitudes.

Table-5: Barriers regarding optional vaccines among mothers of under five children.

QUESTIONS	Yes		No	
	F	%	F	%
Are you adequately aware about the optional vaccine that are available?	256	67%	128	33%
Does the cost of optional vaccines affect your decision to get them to your child?	224	58%	160	42%
Do you feel that optional vaccines are safe for your child?	263	68%	121	32%
Are there any issues related to transportation to health care facilities for vaccinating your child?	199	52%	185	48%
Are you adequately informed by your health care professionals about the benefits of optional vaccines?	195	51%	189	49%
Do you worry about the pain that your child might experience during vaccination process?	251	65%	133	35%
Do you think that your local health care services should provide optional vaccines free of cost?	263	68%	121	32%
Do you require a time-to-time reminder for vaccinating your child?	221	58%	163	42%
Are there any social stigmas	197	51%	187	49%

within your community that affects your decision to vaccinate your child?				

Table 5 outlines the barriers mothers face regarding optional vaccines for under-five children. In terms of awareness, 67% of mothers reported being adequately informed about available vaccines, while 33% were not. Cost emerged as a barrier for 58% of mothers, influencing their decision-making. Regarding safety, 68% felt optional vaccines were safe for their children. Transportation issues were reported by 52% of participants, and 51% mentioned inadequate information from healthcare professionals about the benefits of these vaccines. Concerns about pain during vaccination were highlighted by 65%, and 68% believed that local healthcare services should provide optional vaccines free of cost. Time-to-time reminders were deemed necessary by 58% of mothers, while 51% indicated that social stigmas within their community affected their decision to vaccinate. These findings underscore multiple barriers requiring targeted interventions to improve vaccine acceptance.

Table-6: Association between level of Knowledge and Demographic variables of the study participants

Demographic Variable	x^2	df	P-Value
Age of Mother:	**13.613**	**6**	**0.034 (S)**
18-25 years			
25.1-30 years			
30.1-35 years			
Above 35			
Age of Child			
0-6 months	**12.718**	**6**	**0.048 S**
6 months- 1year			
1-3 years			
3-5 years			
Religion	0.813	4	0.937 NS
Hindu			
Christian			
Muslim			
Other			
Type of Family			
Nuclear	5.758	2	0.056 NS
Joint			
Other			
Education of Mother			
No formal Education	**35.351**	**6**	**0.000 S**
Primary Education			
Secondary Education			
Graduate & above			
Education of Father			
No formal Education	**22.240**	**6**	**0.001 S**
Primary Education			
Secondary Education			
Graduate & above			
Monthly Family Income			
< ₹10,000	**31.190**	**6**	**0.000 S**
₹10,001-₹20,000			
₹20,001-₹30,000			
>₹30,000			
Source of Immunization information			
Healthcare Provider	**21.513**	**10**	**0.018 S**
Family/Friends			
Internet			
Television/Radio			
Govt. Health Campaign			
Other			

Table 6 presents the association between the level of knowledge regarding optional vaccines and the demographic variables of the study participants. Statistically significant associations ($P < 0.05$) were observed for several variables. The age of the mother ($\chi2=13.613\chi^2 = 13.613\chi2=13.613$, $P = 0.034$) and the age of the child ($\chi2=12.718\chi^2 = 12.718\chi2=12.718$, $P = 0.048$) showed significant relationships with knowledge levels. Mother's education ($\chi2=35.351\chi^2 = 35.351\chi2=35.351$, $P = 0.000$) and father's education ($\chi2=22.240\chi^2 = 22.240\chi2=22.240$, $P = 0.001$) were strongly associated, indicating that higher parental education correlated with better knowledge. Monthly family income ($\chi2=31.190\chi^2 = 31.190\chi2=31.190$, $P = 0.000$) and the source of immunization information ($\chi2=21.513\chi^2 = 21.513\chi2=21.513$, $P = 0.018$) also demonstrated significant associations, highlighting economic and informational influences on knowledge. Variables such as religion ($\chi2=0.813\chi^2 = 0.813\chi2=0.813$, $P = 0.937$) and type of family ($\chi2=5.758\chi^2 = 5.758\chi2=5.758$, $P = 0.056$) did not show significant associations, suggesting limited impact on knowledge levels.

Table-7: Association between level of Attitude and Demographic variables of the study participants

Demographic Variable	x^2	df	P-Value
Age of Mother:	9.102	6	0.168 NS
18-25 years			
25.1-30 years			
30.1-35 years			
Above 35			
Age of Child			
0-6 months	5.773	6	0.449 NS
6 months- 1year			

1-3 years			
3-5 years			
Religion			
Hindu	8.534	4	0.074 NS
Christian			
Muslim			
Other			
Type of Family			
Nuclear	2.057	2	0.358 NS
Joint			
Other			
Education of Mother			
No formal Education	14.357	6	0.026 S
Primary Education			
Secondary Education			
Graduate & above			
Education of Father			
No formal Education	8.714	6	0.190 NS
Primary Education			
Secondary Education			
Graduate & above			
Monthly Family Income			
< ₹10,000	**19.362**	**6**	**0.004 S**
₹10,001-₹20,000			
₹20,001-₹30,000			
>₹30,000			
Source of Immunization information			
Healthcare Provider	2.620	10	0.989 NS
Family/Friends			
Internet			
Television/Radio			
Govt. Health Campaign			
Other			

Table 7 presents the association between the level of attitude regarding optional vaccines and the demographic variables of the study participants. Significant associations ($P < 0.05$) were found for the education of the mother ($\chi2=14.357\chi^2 = 14.357\chi2=14.357$, $P = 0.026$) and monthly family income ($\chi2=19.362\chi^2 = 19.362\chi2=19.362$, $P = 0.004$). These findings indicate that higher maternal education and a higher monthly family income are associated with more favorable attitudes toward optional vaccines. Other variables, such as the age of the mother ($\chi2=9.102\chi^2 = 9.102\chi2=9.102$, $P = 0.168$), age of the child ($\chi2=5.773\chi^2 = 5.773\chi2=5.773$, $P = 0.449$), religion ($\chi2=8.534\chi^2 = 8.534\chi2=8.534$, $P = 0.074$), type of family ($\chi2=2.057\chi^2 = 2.057\chi2=2.057$, $P = 0.358$), father's education ($\chi2=8.714\chi^2 = 8.714\chi2=8.714$, $P = 0.190$), and the source of immunization information ($\chi2=2.620\chi^2 = 2.620\chi2=2.620$, $P = 0.989$) did not show significant associations with the level of attitude, indicating limited influence on attitudes towards vaccines.

DISCUSSION

The study revealed significant gaps in knowledge and varying attitudes among mothers of under-five children regarding optional vaccines. A majority (63%) of mothers demonstrated poor knowledge about these vaccines, while only 5% exhibited good knowledge. This finding aligns with several other studies that have reported similar deficiencies in vaccine knowledge among mothers (Author et al., Year; Author et al., Year). In contrast, 71.6% of mothers had a moderate attitude toward vaccination, with 28.1% showing a favorable attitude. Previous research (Author et al., Year) also found that mothers generally have a positive or neutral attitude toward vaccination, but the lack of detailed knowledge often prevents them from making informed decisions regarding their children's health.

The positive correlation between knowledge and attitude ($r = 0.76$) observed in this study emphasizes the importance of addressing both aspects simultaneously. This finding is consistent with [Author et al., Year], who suggested that enhancing mothers' knowledge about vaccines directly contributes to more positive attitudes and decision-making about vaccination. Therefore, it is crucial to implement targeted educational programs that increase awareness and counter misconceptions about vaccines.

In terms of barriers, the study identified several challenges that prevent mothers from opting for optional vaccines. These included cost, lack of awareness, safety concerns, transportation difficulties, and social stigma. These barriers have been widely documented in the literature, with multiple studies (Author et al., Year) highlighting cost as a significant obstacle to vaccine uptake, especially in low-income communities. Similarly, concerns about vaccine safety and inadequate information from healthcare providers remain major factors contributing to vaccine hesitancy (Author et al., Year). Addressing these barriers requires a multi-faceted approach, including improving communication from healthcare professionals, offering vaccines at affordable rates, and ensuring equitable access to vaccination services.

While the study provides valuable insights into the knowledge and attitude of mothers toward optional vaccines, its cross-sectional design and focus on a specific geographic region limit the ability to generalize the findings to a wider population. Further research with larger and more diverse

samples would help confirm these results and offer more robust conclusions.

CONCLUSION:

This study identified a significant knowledge gap regarding optional vaccines among mothers of under-five children, with 63% of mothers having poor knowledge and only 5% demonstrating good knowledge. Despite these deficiencies, a moderate to favorable attitude toward vaccination was found in a majority of the participants (71.6% and 28.1%, respectively). The strong positive correlation between knowledge and attitude underscores the need for targeted educational interventions aimed at improving both knowledge and attitudes toward optional vaccines.

Barriers such as cost, lack of adequate information from healthcare providers, safety concerns, transportation issues, and social stigma were identified as major challenges to vaccine uptake. These findings emphasize the importance of implementing cost-effective vaccination programs, improving communication strategies to dispel vaccine myths, and addressing logistical and social challenges to make vaccines more accessible and acceptable.

The knowledge gaps and barriers to vaccine uptake through comprehensive, community-centered public health initiatives is critical for increasing vaccine coverage and improving child health outcomes. Ensuring that mothers are well-informed and supported by healthcare professionals can contribute significantly to overcoming these challenges and enhancing overall immunization rates.

Statement of Informed Consent: The informed consent form was taken from the postnatal mothers prior to the data collection of the study.

COMPETING INTERESTS: Authors have declared that no competing interests exist

ETHICAL APPROVAL: The study was approved by the institutional ethical committee of Maganbhai **Adenwala Mahagujarat University Ethics Committee. The Ethical Committee approval reference number is: MAM Uni/IECHR/2024/52 .**and a formal written permission was gathered from the authority of or Principal of Institute prior to data collection.

Disclaimer (Artificial intelligence)

Option 1: Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Type of article: Original Research Article Manuscript

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