A Review on Childhood Vaccination and Adherence of Parents Towards Immunization

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***Abstract*— Childhood immunization is one of the pillars of public health, which is also believed to represent the annual million lives saved. Although it contributed to success, parental beliefs and attitudes are key factors at the achievement of high vaccination coverage. The goal of this review is to analyze the state of childhood immunization up to the current stage and parental compliance with vaccination programs. We discuss the role of vaccination in the control of infectious diseases and discuss the main goals of childhood vaccination programs, as high seroprevalence and suppression of the spread of severe childhood diseases. Specifically we also examine the determinants of parental attitudes and beliefs towards vaccination itself, such as misinformation, misconceptions and cultural/socioeconomic factors. Our review also points to the need for specific interventions to gain parents' knowledge, understanding, and acceptance of childhood immunization, thus leading to improved immunization coverage and hence protection of children from vaccine-preventable diseases.**

***Index Terms*— Childhood Immunization, Parental Attitudes, Vaccine Hesitancy, Public Health, Vaccination Barriers.**

I.INTRODUCTION

One of the most phenomenal achievements in world health has been immunization, saving millions from annual death. Vaccines reduce the chances of becoming infected with a disease and work with the body's defence system to build protection. Parents' beliefs on vaccination are among the major determinants towards high immunization rates. Childhood vaccination is viewed as one of the most successful public health tactics of the 20th century for managing and stopping infectious diseases.

A vaccine is made up of bacteria or viruses that are either weakened or dead, and is given to people in order to boost their immune system and prevent them from getting bacterial, viral, or fungal infections. The main aim of childhood vaccination strategies is to control disease by achieving high levels of immunity and halt the transmission of clinically serious childhood diseases by appropriate immunization coverage.. As a result, children who have been vaccinated are shielded from over twelve contagious illnesses like tetanus, diphtheria, measles, polio, and pertussis.

World's health authorities recognize the fact that vaccinating a child is not their concern, but that of his parents. Thus, parents' attitudes, knowledge and perceptions about vaccination are so important since they drive their behaviours toward timely and complete immunisation.

To prevent such conditions from afflicting them, children should be immune to vaccine-preventable diseases (VPD) following national vaccination schedules., highlighting the difficulty health care systems face in adhering to the suggested vaccination timetable. Parental obstacles to vaccination primarily involve issues with keeping track of schedules and understanding their significance, as well as concerns about potential complications and side effects. Moreover, it has been uncovered that 32.9% of infants missed vaccinations because parents were not reminded beforehand, while 26.6% were due to parents forgetting. Various potential remedies for these issues have been examined in research from various perspectives to boost the rate of immunization coverage. For instance, research has shown that reminding patients and implementing recall systems can enhance immunization rates. Several studies have examined various traditional methods of reminding patients, like sending mail and home visits from nurses, along with exploring ways to educate patients about vaccines. Utilizing technology and new media can help improve adherence to children's immunization schedules. It has been discovered that 25% of parents favour using new technologies for vaccination alerts. Yet, there is a lack of proof

regarding the effectiveness of social networks, email communication, and smartphone apps in promoting children's vaccination adherence.

II.STUDY OBJECTIVE

The primary objective of this study is to assess the factors influencing parental adherence to childhood vaccination schedules and to identify barriers or facilitators that affect the timely immunization of children. The study also aims to evaluate parental knowledge, attitudes, and practices (KAP) related to childhood vaccination and how these factors contribute to vaccination adherence.

A. To assess parental knowledge about the importance and benefits of childhood immunization.
B. To examine the attitudes of parents towards childhood vaccination.
C. To evaluate the factors influencing parents' decision-making regarding vaccination, such as healthcare access, vaccine misinformation, cultural beliefs, and socioeconomic status.
D. To identify the barriers to timely vaccination, including logistical, financial, and health system-related factors.
E. To measure vaccination adherence rates among children in different demographic settings (e.g., urban vs rural).
F. To assess the role of healthcare providers (eg: paediatricians, nurses) in promoting vaccination adherence.

III. RATIONALE FOR THE STUDY

A. Public Health Significance

Childhood vaccinations are among the most effective ways to prevent infectious diseases that can lead to severe morbidity and mortality in young children. Vaccines have played a critical role in reducing the burden of preventable diseases globally, such as polio, measles, diphtheria, and pertussis. Despite the proven benefits, there are concerns about the adherence to immunization schedules, which can vary significantly across different regions and communities. This study is essential to examine the factors influencing parental adherence to vaccination guidelines and to identify barriers to vaccine uptake.

B. Vaccine Hesitancy and Misconceptions

Vaccine hesitancy merely refers to the postponement in taking vaccinations as much as those vaccinations are available with the vaccination services; it has become a very alarming challenge across the globe.. Parents' attitudes towards vaccination can be influenced by misinformation, cultural beliefs, lack of awareness, or negative perceptions about vaccine safety. This review aims to understand the factors driving vaccine hesitancy among parents and explore how these attitudes impact adherence rates to childhood immunization programs.

C. Variability in Vaccination Rates

There is a wide variation in childhood vaccination rates across different geographical areas, socioeconomic statuses, and among various demographic groups. In some regions, the immunization coverage is high, while in others, significant gaps remain. Understanding the determinants of vaccination adherence, such as education, socioeconomic status, and access to healthcare, is critical in designing targeted interventions to improve immunization rates and reduce health disparities.

D. Impact of Parental Involvement

Parents play a central role in the decision to vaccinate their children. Factors such as education level, knowledge about vaccines, trust in healthcare providers, and healthcare system accessibility all influence their decision-making. This review will investigate how parental beliefs and behaviors affect the likelihood of timely immunization and whether there are particular interventions that can encourage higher rates of adherence to recommended vaccination schedules.

E. Global Health Goals and Immunization Programs

Childhood immunization is a key component of achieving global health goals, such as those outlined by the World Health Organization (WHO) and the United Nations Sustainable Development Goals (SDGs). These international organizations emphasize the importance of universal vaccination coverage and the need to address gaps in immunization services. A comprehensive review can help inform policies, strategies, and communication approaches that support the successful implementation of vaccination programs.

F. Research Gaps

While numerous studies have explored various aspects of vaccination, fewer have synthesized the available evidence on parental adherence to immunization schedules and the multifactorial influences behind it. This study will fill this gap by conducting a systematic review of the existing literature on childhood vaccination rates and the factors that affect parental adherence, ultimately guiding future research and public health interventions.

G. Health System Implications

By understanding the barriers parents face in adhering to immunization schedules, healthcare systems can be better equipped to implement policies that facilitate access to vaccines, improve communication strategies, and enhance trust between parents and healthcare providers. This review could provide recommendations for strengthening immunization delivery systems, ensuring that children are protected from preventable diseases.

III. STUDY DESIGN

This study will use a cross-sectional descriptive design, by observations from relevant peer-reviewed articles. This approach is well-suited to capture the current state of parental adherence to childhood immunization and to explore the attitudes and factors influencing vaccination decisions.

IV. STUDY TYPE

Cross-sectional survey-based study.

V.SETTING

The studies were conducted in both urban and rural healthcare settings (e.g., primary health centers, hospitals, and community clinics) to assess variability in vaccination adherence across different geographic areas.

The following studies provided valuable insight allowing us to define the objectives of our review based on their work

Study 1: “Are parents' knowledge and practice regarding immunization related to pediatrics’ immunization compliance? a mixed method research” (Omer Qutaiba B Al-lela et.al) [1]
This mixed-method study aimed to explore the relationship between parental knowledge, attitudes, and practices regarding immunization and the actual compliance with pediatric vaccination schedules. The study was designed to identify the factors that influence immunization compliance in children, especially focusing on how well-informed parents are about immunization and how their beliefs and practices impact whether their children receive vaccines on time.

The researchers used both quantitative (surveys) and qualitative (interviews) methods to gather data from a sample of parents in order to capture a comprehensive view of vaccination practices and compliance. The study also sought to understand the factors that contribute to vaccine hesitancy and the challenges parents face in following immunization schedules.

Key findings:

A. Parental Knowledge About Immunization

1. Knowledge Gaps: The study revealed that while most parents had some knowledge about the importance of immunization, knowledge gaps were prevalent. Parents often lacked complete information about the specific vaccines required at various stages of their child's life, which contributed to delayed vaccinations.
2. Impact of Knowledge on Compliance: There was a clear positive correlation between higher levels of knowledge about vaccines and better adherence to vaccination schedules. Parents who understood the importance of immunization and the risks of vaccine-preventable diseases were more likely to ensure their children were vaccinated on time.
3. Misconceptions About Vaccines: Some parents expressed concerns about vaccine safety due to misinformation from the internet or social networks. These misconceptions led to vaccine hesitancy or outright refusal.

B. Attitudes Towards Vaccination

1. Positive Attitudes Leading to Compliance: Parents who had positive attitudes towards vaccination, viewing it as a necessary and beneficial practice for child health, were more likely to adhere to vaccination schedules.
2. Vaccine Hesitancy: A significant number of parents displayed vaccine hesitancy, particularly among those who believed in unverified rumors about vaccines, such as fears of side effects, or those influenced by anti-vaccine sentiments

within their social circles.

3. Role of Healthcare Providers: Parents who trusted their healthcare providers and received clear communication from doctors or pediatricians about the benefits and safety of vaccines were more likely to comply with vaccination schedules.

C. Parental Practices and Immunization Compliance

1. Timeliness of Vaccinations: The study showed that timely vaccination compliance was strongly linked to parental organization and planning. Parents who kept track of vaccination dates and had a set schedule for visiting health clinics were more likely to follow the immunization schedule.
2. Barriers to Compliance: Common barriers to timely vaccination included healthcare access issues, such as long waiting times at clinics, inconvenient clinic hours, and travel difficulties. Financial constraints, such as cost of transportation or missed work for vaccination appointments, also contributed to delays.

D. Socioeconomic Factors

1. Influence of Socioeconomic Status: The study highlighted that higher socioeconomic status was associated with better vaccination adherence. Parents with higher education levels and better access to healthcare services were more likely to follow vaccination schedules.

2. Lower Compliance in Low-Income Families: Families from lower-income backgrounds faced greater challenges in adhering to immunization schedules due to factors such as limited access to healthcare services, lack of transportation, and financial constraints.

E. Healthcare System and Access

1. Importance of Healthcare Provider Engagement: Parents who reported positive interactions with healthcare providers—especially those who were well-informed, accessible, and supportive—were more likely to adhere to immunization schedules.

2. Role of Healthcare Providers: The study suggested that healthcare professionals played a significant role in encouraging vaccination by providing information, addressing concerns, and offering regular reminders to parents.

F. Cultural and Social Influences:

1. Cultural Beliefs and Misconceptions: Some parents were influenced by cultural beliefs or peer opinions, which led them to question or delay vaccination. For example, some parents adhered to traditional practices and were skeptical of modern medical advice regarding immunization.

2. Peer Influence and Social Networks: Social networks, including family and friends, played a critical role in shaping parental attitudes toward vaccination. In some cases, parents were swayed by negative opinions or fears expressed by their social circle, which contributed to vaccine refusal or delayed vaccination.

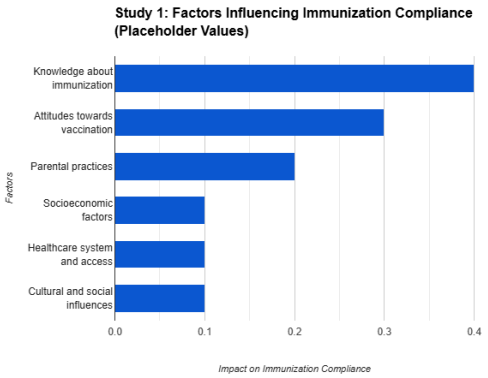

Fig 1: Factors influencing immunization compliance

In conclusion, this study was essential for identifying the key challenges to effective vaccination and adherence, addressing public concerns, and improving overall vaccination rates. The findings were crucial in shaping future public health interventions and policies, contributing to the global effort to eliminate preventable childhood diseases.

Study 2: A systematic review of studies that measure parental vaccine attitudes and beliefs in childhood vaccination (Amalie Dyda et.al) [2]

This systematic review examined studies that measured parental attitudes and beliefs towards childhood vaccination, aiming to understand the factors that influenced vaccine hesitancy and refusal. The review synthesized the findings from various studies conducted in different global contexts, assessing how parental beliefs and attitudes affected vaccination uptake. The authors explored a range of factors, including cultural, psychological, social, and informational elements that either supported or

hindered vaccination adherence. The review provided valuable insights into the underlying reasons for vaccine hesitancy and refusal, which could guide future interventions to increase vaccination coverage.

Key Findings:

A. *Vaccine Hesitancy*

- The review highlighted that vaccine hesitancy was a global issue, with varying levels of hesitancy across different regions. The authors emphasized that vaccine hesitancy was not merely about refusal, but also included delayed vaccination and uncertainty about vaccine safety and necessity.
- Parental hesitancy was often driven by doubts about vaccine safety, misinformation, and negative experiences with healthcare providers

B. *Factors Influencing Vaccine Attitudes*

- Misinformation and Social Media: One of the most significant factors influencing vaccine attitudes was exposure to misinformation, especially through social media. Studies showed that misinformation could undermine trust in vaccines and healthcare professionals.
- Trust in Healthcare Providers: Parents who trusted healthcare providers were more likely to vaccinate their children. The review underscored the importance of clear and consistent communication from healthcare professionals to counteract vaccine hesitancy.
- Cultural and Religious Beliefs: Parental attitudes towards vaccines were found to be influenced by cultural and religious beliefs. In some cases, parents refused vaccines due to beliefs that vaccines were unnatural or contrary to religious teachings.
- Education and Socioeconomic Status: Higher levels of parental education and socioeconomic status were correlated with greater vaccine acceptance. However, education alone was not a guarantee of vaccine uptake, as knowledge about vaccines did not always translate into positive attitudes or behaviors.
- Perceived Risk and Disease Threat: Parents' beliefs about the risks of vaccine-preventable diseases (VPDs) also played a role in vaccine attitudes. Parents who perceived a higher risk of diseases were more likely to vaccinate their children.

C. *Impact of Vaccine Autonomy and Freedom*

- Some parents were motivated by a desire for personal choice in health decisions, reflecting a belief that parents should have the freedom to make medical decisions for their children without external pressure. This sentiment was particularly noted in studies from Western countries.

D. *Demographic Differences:*

- The review found that certain demographic factors, such as age, gender, and prior vaccination history, also affected parental vaccine attitudes. For example, younger parents were more likely to express vaccine hesitancy compared to older parents.

E. *Intervention Strategies*

- The review suggested that targeted interventions should focus on addressing misinformation, improving communication between healthcare providers and parents, and fostering trust in vaccines through community engagement and educational campaigns. Additionally, providing parents with clear, evidence-based information about vaccine safety and efficacy could help reduce vaccine hesitancy

G. Gaps in Research

- The authors noted that while many studies measured parental vaccine attitudes, there was a lack of consistency in the methods and frameworks used to assess these attitudes. They recommended more standardized approaches for future research to allow for better comparison and synthesis of findings across studies.

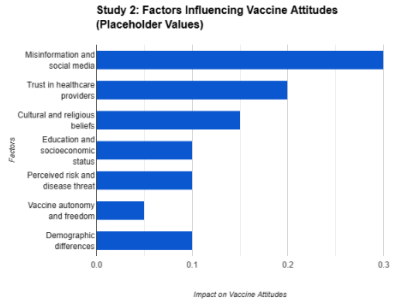

Fig 2: Factors influencing vaccine attitudes

This systematic review concluded that parental vaccine attitudes were shaped by a complex interplay of factors, including trust in healthcare providers, cultural beliefs, exposure to misinformation, education, and personal autonomy. Addressing vaccine hesitancy required multifaceted strategies,

including improved communication, targeted interventions, and education, to enhance vaccine acceptance and adherence. The study emphasized the importance of understanding these factors to inform public health policies and interventions aimed at increasing vaccination rates.

Study 3: Survey of the prevalence of immunization non-compliance due to needle fears in children and adults (Anna Taddio et.al) [3]

The study probably provided a comprehensive survey on the prevalence of needle fear and how this fear acted as a barrier to receiving vaccinations. Needle phobia, which could manifest as anxiety, fear of pain,or prior negative experiences with injections, was a well-documented issue that affected both children and adults. The authors likely focused on the psychological and social aspects of needle fear, identifying how it could lead to delays or refusal of immunization.
The research might have involved surveys and data collection from diverse populations, analyzing factors such as:
•The prevalence of needle fear in different demographic groups.
•Attitudes and behaviors regarding immunization and needle-related fears.
•Strategies to reduce fear and improve vaccine compliance, including psychological and medical interventions.

Key Findings:

A. Prevalence of Needle Fear

- The study likely identified that needle fear was a common issue among both children and adults, with a higher prevalence in younger children.
- Adults also suffered from needle phobia, which affected their own vaccination behavior and may have even influenced their decisions to vaccinate their children.

B. Impact on Immunization Non-Compliance

- Needle fear was found to be a significant barrier to vaccine uptake, leading to non-compliance or delays in vaccination schedules.
- The fear of pain or past traumatic experiences with needles may have caused individuals to delay or completely avoid vaccinations, resulting in missed opportunities for immunization

C. *Psychological and Emotional Factors*

- The study highlighted the psychological impact of needle fear, including anxiety, phobia, and the anticipation of pain.
- Cultural influences and family dynamics may have also played a role in shaping attitudes toward vaccination, as parents who had needle fears themselves may have been less likely to vaccinate their children

D. *Age-related Differences*

- Children were particularly vulnerable to needle fear due to limited exposure to medical procedures and potentially painful past experiences.
- Adults, particularly those who avoided medical appointments or had traumatic vaccination experiences, may have also exhibited fear that prevented them from adhering to vaccination schedules, especially with vaccines such as the flu shot or HPV vaccine

E. *Barriers Beyond Needle Fear*

- The study likely discussed additional factors that contributed to vaccine non-compliance, such as misinformation, lack of access to healthcare services, and general vaccine hesitancy.
- Needle fear often interacted with other barriers, making it a multifaceted challenge in immunization efforts

G. Strategies to Address Needle Fear

- Pain reduction strategies such as numbing creams or sprays to decrease the discomfort of injections.
- Distraction techniques like using toys or videos to help children focus away from the needle.
- Healthcare provider training to improve communication and reduce patient anxiety, by using calm, supportive language and providing clear explanations of the procedure.
- Psychological support or counseling for individuals with extreme fears or phobias

H. Education and Public Health Campaigns

- The study might have suggested that educational initiatives aimed at both children and parents were

essential to reduce misconceptions about vaccinations and the pain associated with needles.
- Public health campaigns could have focused on promoting the importance of vaccination and providing information about pain-management options

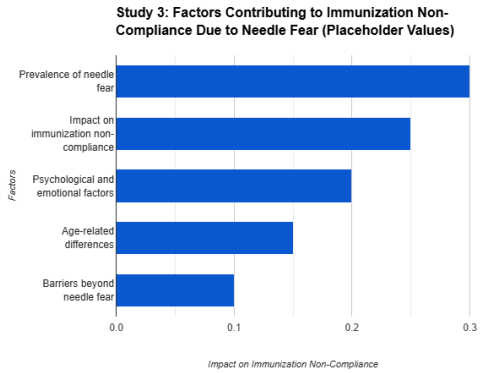

Fig 1: Factors contributing to immunization non-compliance due to needle fear

The study concluded that needle fear was a significant, but often underrecognized, factor contributing to immunization non-compliance. It called for targeted interventions that addressed psychological factors related to vaccination, alongside broader public health strategies to ensure that needle fear did not become a barrier to achieving higher vaccination rates.

Study 4: Parents' Knowledge, Attitude and Perceptions on Childhood Vaccination in Saudi Arabia: A Systematic Literature Review (Marwa Alabadi and Zakariya Aldawood) [4]

This systematic literature review aimed to understand parents' knowledge, attitudes, and perceptions regarding childhood vaccination in Saudi Arabia. Nine studies were included in the review, demonstrating that parents' overall knowledge level on childhood vaccination was considered good. However, their knowledge varied across different categories of vaccine-related information. Parents' attitudes towards vaccination were generally positive, with most adhering to the vaccination program and encouraging others to vaccinate their children. While some parents expressed concerns about potential side effects like autism and learning difficulties, the majority recognized the benefits of vaccination in protecting children from serious diseases. Factors such as gender, education level, and exposure to vaccine-related information influenced parents' knowledge, attitudes, and perceptions.

Key Findings:

- Overall Positive Attitudes: Parents in Saudi Arabia generally held positive attitudes towards childhood vaccination.
- Variable Knowledge Levels: While parents had a good overall understanding of vaccination, knowledge gaps existed in specific areas, such as vaccine-preventable diseases and the importance of timely vaccination.
- Influence of Misinformation: Misinformation and misconceptions, often spread through social media, negatively impacted parents' attitudes and decision-making regarding vaccination.
- Role of Healthcare Providers: Healthcare providers played a crucial role in addressing parents' concerns, providing accurate information, and building trust to improve vaccine acceptance.
- Importance of Health Education: Effective health education campaigns were essential to dispel myths, correct misinformation, and promote informed decision-making about vaccination.

V. COMPARISON OF THE STUDIES

The four studies collectively explore various factors influencing parental attitudes, knowledge, and behaviors regarding childhood vaccination, highlighting the complex interplay between education, misinformation, healthcare access, and psychological barriers. Study 1 (Omer Qutaiba B Al-lela et.al) examines the relationship between parental knowledge, attitudes, and immunization compliance, emphasizing that informed parents with positive attitudes and good communication with healthcare providers are more likely to adhere to vaccination schedules. Study 2 (Amalie Dyda et.al) expands on these findings through a systematic review, showing that misinformation, trust in healthcare providers, and cultural beliefs are major determinants of vaccine hesitancy. Study 3 (Anna Taddio et.al) introduces the psychological factor of needle fear, highlighting its significant role in vaccine non-compliance among both children and adults, with practical interventions suggested to reduce fear and anxiety. Finally, Study 4 (Marwa Alabadi and Zakariya Aldawood) focuses on Saudi Arabia, revealing that while parents generally have positive attitudes and good knowledge about vaccinations, misinformation, particularly from social media, poses a challenge. All studies stress the

importance of education, trust-building with healthcare providers, and addressing psychological and social factors to improve vaccination uptake. Together, they emphasize a multifaceted approach to combating vaccine hesitancy and increasing .

VI. CONCLUSION

This review examines the factors influencing parental adherence to childhood vaccination schedules. Key findings highlight the complex interplay between parental knowledge, attitudes, and access to healthcare. Misinformation, cultural beliefs, and needle fear can pose significant barriers to timely immunization. Addressing these issues requires a multifaceted approach, including public health campaigns, healthcare provider training, targeted interventions, and improved access to vaccination services. By implementing these strategies, we can enhance parental adherence and protect children from preventable diseases.

Furthermore, the review emphasizes the importance of building trust between healthcare providers and parents, as well as addressing the psychological factors that may contribute to vaccine hesitancy. By understanding and addressing these factors, we can improve vaccination rates and ensure the continued success of immunization programs in protecting public health.

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