



Overview of the Parents' Knowledge, Attitude and Practice of Children Vaccinations: A Systematic Review

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Abstract

Background: It is the parents' responsibility to vaccinate their children. As a result, parents' attitudes, knowledge, and beliefs about vaccination are critical because they influence their activities toward timely and full immunization.

Objectives: This systematic review comprehensively investigated the recently published literature on parents' knowledge regarding children's vaccination.

Methods: PubMed, SCOPUS, Web of Science, Science Direct, and Google Scholar were systematically searched to include the relevant literature. Rayyan QRCI was used throughout this systematic approach.

Results & interpretation: This review included twenty-four studies with a total of 13082 parents, and 70.9% were mothers. Knowledge level about children's vaccination among parents was significantly related to their fathers' age, education level, women's employment status, and family type. Younger mothers were found to have a higher level of expertise. Good knowledge levels and positive attitudes towards the seasonal influenza vaccine were reported. Good knowledge with caution was reported among parents regarding COVID-19 vaccination. The knowledge about HPV infection and vaccination: All of them reported low vaccination rates and willingness to vaccinate their children. The findings of our study highlight the significance of parental understanding of vaccinations and immunization. Health officials should make additional efforts to promote the benefits of vaccination while emphasizing the risks of non- or late pediatric immunization.

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Keywords; Parents; Knowledge; Immunization; Vaccination; Systematic review.

Introduction

Vaccines are, without a doubt, among the most cost-effective interventions in the health-care system. It is inexpensive, but it provides huge benefits to the population health and well-being. According to WHO data, 10.6 million children die before the age of five each year, with an estimated 1.4 million of those deaths caused by diseases that could have been avoided with immunizations [1, 2]. Vaccines save over 3 million lives each year in addition to preventing millions more from disease and disability [3]. For example, with the advent of the Polio vaccine, it is projected that 5 million persons who would have been paralyzed by the poliovirus are now walking [4].

When the incidence of vaccine-preventable diseases decreases, so does public awareness of the danger of adverse outcomes, resulting in lower vaccination coverage [5]. Negative parental vaccination attitudes have been found as a significant barrier to pediatric immunization [6]. As a result, it is critical to understand which factors influence parents' decisions about whether or not to vaccinate their children. According to several research [7-10], healthcare providers have a favorable influence on parental decisions to vaccinate their children, including parents who believe immunizations are dangerous [11].

Vaccine hesitancy is defined by WHO as the refusal or delay in vaccination [12]. The main reason for this behavior is uncertainty about the safety of vaccines, which is exacerbated by negative experiences or media [13]. The internet's ease of use has increased the reach of anti-vaccination campaigns while also facilitating the dissemination of disinformation [14]. Another reason for reluctance is the infrequent observation of VPD's bad results, which have become quite rare. As a result, many parents believe that immunizations are unnecessary, with the risks outweighing the benefits [15, 16].

When it comes to vaccination practices, numerous elements influence the decision-making process. Several studies have found that unvaccinated children were primarily white, had older moms with greater levels of education, and came from well-off homes [17]. Other research found that highly educated moms vaccinated their children more frequently [18]. The cost of vaccinations appears to be a factor in immunization status [19]. Furthermore, several studies have shown that living with people who promote immunization and vaccinate their children results in favorable views about vaccination [20].

It is the parents' responsibility to vaccinate their children. As a result, parents' attitudes, knowledge, and beliefs about vaccination are critical because they influence their activities toward timely and full immunization. This systematic review aims to comprehensively investigate the recently published literature on the parents' knowledge regarding children's vaccination.

Methodology

This systematic review was conducted in accordance with accepted standards (Preferred Reporting Items for Systematic Reviews and Meta-Analyses, PRISMA) [21].

Study Design and Duration

This was a systematic review conducted between August and September 2023.

Search strategy

A thorough search of five major databases, including PubMed, SCOPUS, Web of Science, Science Direct, and Google Scholar, was done to find the relevant literature. We restricted our search to English and considered each database's unique requirements. The following keywords were converted into PubMed Mesh terms and used to find the relevant studies; "Parents," "Guardians," "Caregivers," "Vaccination," "Immunization", " and "Children." The Boolean operators "OR" and "AND" matched the required keywords. Publications with full English text, available free articles, and human trials were among the search results.

Selection criteria

We considered the following criteria for inclusion in this review:

- Study designs that investigated the recently published literature on the parents' knowledge regarding children's vaccination.
- Recent studies conducted in the five ten years (2019-2023).
- English language.

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- Free accessible articles.

Data extraction

The search strategy's output was checked for duplication using Rayyan (QCRI) [22]. The researchers evaluated the titles' and abstract relevance by modifying the combined search results using a set of inclusion/exclusion criteria. The reviewers carefully examined each paper that met the criteria for inclusion. The authors covered techniques for resolving disputes. Using a previously created data extraction form, the authorized study was uploaded. The authors extracted data about the study titles, authors, study year, country, participants, gender, type of vaccination, and main outcomes. A separate sheet was created for the risk of bias assessment.

Strategy for data synthesis

To give a qualitative analysis of the findings and study components, summary tables were made utilizing data from relevant research. Once the data for the systematic review were retrieved, the most efficient way to use the data from the included study articles was chosen.

Risk of bias assessment

The ROBINS-I risk of bias assessment method for non-randomized trials of treatments was used to assess the quality of the included studies [23]. The seven topics that were assessed included confounding, participant selection for the study, classification of interventions, deviations from intended interventions, missing data, assessment of outcomes, and selection of the reported result.

Results

Search results

A total of 505 study articles resulted from the systematic search, and 97 duplicates were deleted. Title and abstract screening were conducted on 408 studies, and 350 studies were excluded. 58 reports were sought for retrieval, and no articles were retrieved. Finally, 58 studies were screened for full-text assessment; 20 were excluded for wrong study outcomes, and 14 for the wrong population type. Twenty-four study articles were included in this systematic review. A summary of the study selection process is presented in **Figure 1**.

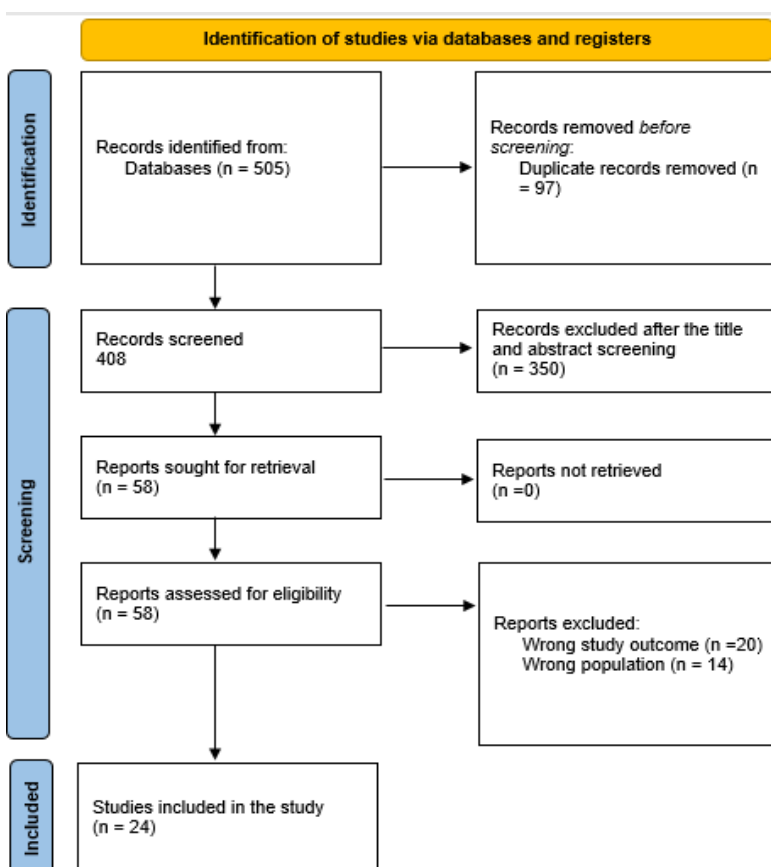


Figure (1): PRISMA flowchart summarizes the study selection process.

Characteristics of the included studies

Table (1) presents the sociodemographic characteristics of the included study articles. Our results included nine studies with a total of 13082 parents, and 9274 (70.9%) were mothers. All of the included articles were cross-sectional studies [24-47]. **Table (2)** presents the clinical characteristics. Five studies generally spoke about parents' knowledge and attitudes towards vaccinations. Four of them reported moderate knowledge levels [24, 25, 26, 28], and one demonstrated a lack of understanding about children's immunization and inadequate vaccination practices, particularly among males compared to females [27]. **Hussain & Mohammed** reported that knowledge level was significantly related to their fathers' age, level of education, employment status of women, and family type [26].

Only one study reported inadequate knowledge about the seasonal influenza vaccine [31]. The lack of knowledge was particularly among young female guardians, low-income households, parents with low education levels, and fear of side effects [29, 33]. Younger mothers were found to have a higher level of expertise [34].

Eight studies assessed the parents' knowledge regarding COVID-19 vaccination; seven reported that parents were well knowledgeable but cautious about COVID-19 vaccination [35-39, 41]. **Al-Qerem et al.** reported that only 30.2% of participants were willing to vaccinate their children, which is concerning [40]. Six studies assessed the knowledge about HPV infection and vaccination; all of them reported low vaccination rates and willingness to vaccinate their children [42-47].

Table (1): Sociodemographic characteristics of the included participants.

Study	Study design	Country	Participants	Mean age (years)	Females (%)
Gowin et al., 2021 [24]	Cross-sectional	New Guinea	56	NM	52 (92.8)
Eltaib & Alenzi et al., 2020 [25]	Cross-sectional	Saudi Arabia	358	NM	155 (43)
Hussain & Mohammed 2021 [26]	Cross-sectional	Iraq	292	NM	234 (80)
Altreyfy et al., 2019 [27]	Cross-sectional	Saudi Arabia	377	NM	187 (49.6)
Alghamdi et al., 2020 [28]	Cross-sectional	Saudi Arabia	301	21-50	168 (55.8)
Wu et al., 2023 [29]	Cross-sectional	China	1404	NM	972 (69.23)
Thanee et al., 2021 [30]	Cross-sectional	Thai	627	NM	560 (80)
Awad et al., 2019 [31]	Cross-sectional	Jordan	1235	NM	707 (57.3)
Al-Qerem et al., 2023 [32]	Cross-sectional	Jordan	667	38	419 (62.8%)
Alqarza et al., 2022 [33]	Cross-sectional	Saudi Arabia	801	NM	325 (41.1%)
Hameed & Jubair 2021 [34]	Cross-sectional	Iraq	288	27.7 ± 6.3	263 (91.3%)
Ezgi et al., 2022 [35]	Cross-sectional	Turkey	208	NM	165 (79.3)
Nguyen et al., 2023 [36]	Cross-sectional	Vietnam	388	36.9 ± 5.9	262 (67.5)
Mohammed & Ismail 2022 [37]	Cross-sectional	Saudi Arabia	268	41.04±6.9	221 (82.5)
Akgün et al., 2022 [38]	Cross-sectional	Turkey	201	22-64	111 (55.2)
Sinuraya et al., 2022 [39]	Cross-sectional	Indonesia	276	NM	226 (81.9)
Al-Qerem et al., 2022 [40]	Cross-sectional	Jordan	819	NM	581 (70.9)
Bourguiba et al., 2022 [41]	Cross-sectional	UAE	437	39 ± 8.7	359 (82.2)

Elit, et al., 2022 [42]	Cross-sectional	Cameroon	45	41.5	35 (81.5)
Victory et al., 2019 [43]	Cross-sectional	USA	622	38.1 ± 7.4	525 (84.4)
Çelik et al., 2021 [44]	Cross-sectional	Turkey	1000	37.7 ± 6.4	762 (76.2)
Rancic et al., 2022 [45]	Cross-sectional	Serbia	615	NM	398 (64.7)
Nassif et al., 2023 [46]	Cross-sectional	Lebanon	392	42.48 ± 5.4	376 (95.9)
López et al., 2022 [47]	Cross-sectional	Spain	1405	NM	1211 (86.2)

*NM=Not mentioned

Table (2): Clinical characteristics and outcomes of the included studies.

Study	Type of vaccination	Main outcomes	ROBIN-I
Gowin et al., 2021 [24]	Vaccinations	The vast majority of youngsters are not completely immunized. Because disease protection is inadequate, there is a very high danger of a vaccine-preventable illness epidemic in the population. This can be improved by improving healthcare service distribution, particularly in rural areas.	Moderate
Eltaib & Alenzi et al., 2020 [25]	Vaccinations	Although their knowledge and good views towards vaccination are moderate, parents are significantly persuaded by the perceived benefits of vaccination and bring their children for immunization. Misconceptions in vaccination knowledge and attitudes have been documented, particularly the notion that vaccines cause autism, which may contribute to vaccine hesitation.	Moderate
Hussain & Mohammed 2021 [26]	Vaccinations	The majority of investigated parents had a moderate level of knowledge, which was significantly related to their fathers' age, level of education, employment status of women, family type, and the fact that more than sixty percent of researched parents have partially immunized children. Parents' awareness had no effect on their child's immunization status.	High
Altreyfy et al., 2019 [27]	Vaccinations	Parents in Taif, Saudi Arabia, demonstrated a lack of understanding about kid immunization and inadequate vaccination practices, particularly among males compared to females.	Moderate
Alghamdi et al., 2020 [28]	Vaccinations	While some parents were misinformed about the hazards of new vaccines and favored natural immunity over-vaccination, the majority of parents were concerned about the potential side effects of vaccines but recognized their value in building the immune system. Some parents were skeptical of vaccines and preferred alternate means of disease prevention.	Moderate
Wu et al., 2023 [29]	The seasonal influenza vaccine	Cognitions and behaviors surrounding influenza vaccination for children are uneven, particularly among young female guardians, low-income households, and parents with low education levels. Social influence, relative knowledge, and hesitancy all influence vaccination.	High
Thanee et al., 2021 [30]	The seasonal influenza vaccine	The majority of childcarers were aware of influenza sickness and the influenza vaccine. Carers came from a variety of socioeconomic and educational levels, which influenced their attitude/perception and practice about influenza vaccination in the children enrolled. Carers of vaccinated children had greater socioeconomic levels than their unvaccinated peers. The most trusted source of information on influenza vaccine for most carers was healthcare providers.	Moderate
Awad et al., 2019 [31]	The seasonal influenza vaccine	Children's influenza vaccination coverage as well as knowledge of the illness and vaccination, were both inadequate. Adopting public health policies is essential	

		for spreading knowledge about influenza sickness and immunization and encouraging children to receive the influenza vaccine.	Moderate
Al-Qerem et al., 2023 [32]	The seasonal influenza vaccine	Although most parents have good knowledge and attitudes about asthma and good opinions of the flu vaccine in children with asthma, the incidence of vaccination among children was low.	Moderate
Alqarza et al., 2022 [33]	The seasonal influenza vaccine	The results suggest a strong relationship between gender and receiving flu vaccine $P = 0.006$, and the most prevalent barrier that inhibits parents from vaccinating their children is their concern about potential adverse effects.	Moderate
Hameed & Jubair 2021 [34]	The seasonal influenza vaccine	The majority of participants were knowledgeable and positive about seasonal children influenza immunization. Younger mothers were found to have a higher level of expertise. Only a small fraction of illiterate mothers were knowledgeable. The majority of knowledgeable parents had a modest household income.	High
Ezgi et al., 2022 [35]	COVID-19 vaccination	Although most parents are eager to vaccinate themselves with the COVID-19 vaccine, most parents are cautious about vaccinating their children due to vaccine side effects.	Moderate
Nguyen et al., 2023 [36]	COVID-19 vaccination	The COVID-19 vaccine was accepted by 72.4% of the children who received it. The majority of parents (56.7% and 52.3%, respectively) had moderate knowledge and attitudes. Parents with good knowledge and attitudes were more likely to agree to the COVID-19 vaccine for their children ($P=0.05$).	Moderate
Mohammed & Ismail 2022 [37]	COVID-19 vaccination	The majority of parents are knowledgeable about COVID-19 for children, and there is a substantial association between child sex, source of COVID-19 vaccine information, and parental understanding.	Moderate
Akgün et al., 2022 [38]	COVID-19 vaccination	Parents were more likely than their children to accept a COVID-19 immunization. The willingness of people to accept the vaccine is critical to the success of COVID-19 vaccination programs.	Moderate
Sinuraya et al., 2022 [39]	COVID-19 vaccination	Respondents with a university diploma were more knowledgeable than those with a senior high school diploma (P -value=0.05). Employed participants outperformed jobless people in terms of knowledge and practice (P -value=0.05).	High
Al-Qerem et al., 2022 [40]	COVID-19 vaccination	There is significant parental reluctance to embrace vaccines. The current survey found that only 30.2% of participants were willing to vaccinate their children, which is concerning.	Moderate
Bourguiba et al., 2022 [41]	COVID-19 vaccination	Many UAE parents have immunized their children against COVID-19. Previous parental vaccination practices, as well as favorable parental attitudes, were major predictors of COVID-19 vaccine uptake in children.	Moderate
Elit, et al., 2022 [42]	HPV vaccine	There was widespread ignorance about the availability and aim of HPV vaccination among parents of vaccine-eligible girls in rural Cameroon. In this context, it appears that mainstream media and top-down health education programs are ineffective.	Moderate
Victory et al., 2019 [43]	HPV vaccine	Although parents and guardians of students in the fourth through twelfth grades are aware of HPV and the HPV vaccine, healthcare providers must actively engage with parents to explain HPV and the HPV vaccine. A substantial body of research supports the relevance of raising the frequency and quality of physician recommendations for HPV vaccination, particularly in a low-income Hispanic population.	Moderate
Çelik et al., 2021 [44]	HPV vaccine	Even in a group with a high socioeconomic status and access to health care, awareness of HPV infection and vaccination was relatively low. HPV vaccination is also quite low.	High

Rancic et al., 2022 [45]	HPV vaccine	Children under the age of 15, female children, urban residency, parents' medical knowledge, pediatrician recommendation of vaccination, and free vaccination were all significant factors in positive parental decisions concerning HPV vaccination for their children. Boys aged 15 and up received significantly less vaccination than girls in the same age group.	Moderate
Nassif et al., 2023 [46]	HPV vaccine	The bulk of HPV comments and the HPV vaccine were unknown to parents. There was a statistically significant positive link between "intention to vaccination against HPV" and having details regarding the HPV vaccine and knowledge about the HPV vaccine.	Moderate
López et al., 2022 [47]	HPV vaccine	The level of parental HPV knowledge and vaccine acceptance is medium to high. However, HPV is still linked with women, with a significant paucity of knowledge about HPV repercussions in men.	Moderate

Discussion

Childhood vaccination is an important part of public health since it protects children from a variety of dangerous diseases. While vaccines have proven to be quite effective, there are times when parents may be unfamiliar with them. This comprehensive review stated a moderate to low knowledge about children's immunization and inadequate vaccination practices, particularly among males compared to females [24-27]. **Hussain and Mohammed** reported that knowledge level was significantly related to their fathers' age, education level, women's employment status, and family type [26].

Vaccination is regarded as the most cost-effective option for reducing hospitalization, treatment expenses, morbidity, and death associated with vaccine-preventable diseases [48]. However, vaccination confronts numerous challenges, including vaccine myths, vaccine side effects, and vaccine-avoidable diseases [49]. Parental vaccination impression is critical for increasing immunization rates and parental compliance [50]. The most crucial element impacting parents' vaccination behavior towards their children is their understanding of vaccination [51].

According to the WHO's global strategy known as the Immunization Agenda 2030, by 2030, every child should have received all recommended immunizations, regardless of geographical area, age, socioeconomic position, or gender-related limitations [52]. The WHO launched the Expanded Programme on Immunization (EPI) in 1974 to manage diseases that may be prevented through immunization [53]. Following the implementation of the EPI program, the number of mortality among children under the age of five remained at 5.3 million in 2018 [54].

Despite the tremendous success, the expanded immunization program faces numerous challenges. These are classified as follows: policy, standards, and guidelines; human resources; vaccination management; cold chain management and logistics; service delivery, communication, and community collaborations; and long-term funding [55].

Only one study [31] found that people were unaware of the seasonal influenza vaccine. Young female guardians, low-income households, parents with poor education levels, and fear of adverse effects were all associated with a lack of information [29, 33]. Younger mothers were shown to be more knowledgeable [34]. Childhood influenza vaccine should be an effective means of decreasing the disease's total burden, particularly its significant effects (hospitalization and sequelae) in children. Furthermore, childhood influenza vaccination reduces the spread of influenza to vulnerable persons and the elderly, who respond less well to vaccination [56]. Schoolchildren are effective and major influenza spreaders [57], with over half of all influenza infections in children being asymptomatic or having very mild symptoms [58]. Furthermore, due to the intimate interaction of this group with other family members [57], children transmit the virus for a longer period of time and with larger viral loads, promoting the indiscriminate spread of infection. Evidence suggests that influenza vaccination of students not only protects vaccinated children but also minimizes viral exposure among people in their homes and other members of their community.

Good knowledge with caution were reported among parents regarding COVID-19 vaccination in this study. Effective communication with parents, as well as providing adequate transparency and information, can boost confidence in the COVID-19 vaccines, making the community less hesitant to vaccinate their children, resulting in a large majority of the population voluntarily complying, assisting the world in achieving herd immunity. Physicians and the media can play an important role in earning parents' trust in these situations [59]. Furthermore, we can be optimistic about the mandatory pediatric vaccination program because mandatory SARS-CoV2 vaccination for children does not imply forcing parents to vaccinate their children but rather implies that only some of their privileges are withheld if they refuse to obey the law [60].

COVID-19 is well-known for being primarily a silent infection in children [61]. It is yet unknown whether asymptomatic infected infants with modest viral burdens may shed the virus efficiently enough to serve as the primary source of transmission [62]. Assuming that pediatric immunization is required to produce herd immunity, no vaccine, including those against COVID-19, has been proven to be completely safe and effective in the elderly and other vulnerable individuals [63]. Indeed, if a mandated pediatric vaccination programme is undertaken, the expected utility, defined as the expected benefits minus the expected harms, should be assured for both the child and society [64].

Six studies assessed the knowledge about HPV infection and vaccination; all of them reported low vaccination rates and willingness to vaccinate their children [42-47]. Estimates of National HPV Immunisation Coverage from 2010 to 2019 were published by the World Health Organization/The United Nations Children's Emergency Fund (WHO/UNICEF) in 2020. This report stated that 107 (55%) of the 194 WHO Member States had implemented HPV vaccination. America and Europe are by far the WHO areas with the most introductions, with 85% and 77% of their respective nations having previously implemented HPV vaccination, with nearly one-third of the program (33 out of 107) being gender-neutral [65]. Many nations have recognized the importance of HPV gender-neutral vaccination programs in reaching the objective of eliminating not only cervical cancer but also all HPV-related illnesses [66].

These rates may be influenced by parental vaccine beliefs, attitudes, and intentions [67, 68]. The low HPV vaccination rates recorded reflect the poor recommendation rate for the HPV vaccine by RGV healthcare providers. A recent study in South Carolina, a state with low HPV vaccination completion (34% for girls and 16% for boys), revealed the main barrier to uptake was a lack of physician endorsement [69]. Efforts to raise public awareness and information about HPV and HPV-related cancer are ineffective unless providers make strong recommendations for the HPV vaccine. Other research emphasizing how the HPV vaccination prevents HPV infection and hence lowers the risk of HPV-related malignancies in the future has enhanced parental acceptance of vaccine uptake [70].

Conclusion

Knowledge level about children's vaccination among parents was significantly related to their fathers' age, education level, women's employment status, and family type. Younger mothers were found to have a higher level of expertise. Good knowledge levels and positive attitudes towards the seasonal influenza vaccine were reported. Good knowledge with caution was reported among parents regarding COVID-19 vaccination. The knowledge about HPV infection and vaccination: All of them reported low vaccination rates and willingness to vaccinate their children.

The findings of our study highlight the significance of parental understanding of vaccinations and immunization. Trust between pediatricians and mothers is crucial, as is clear, concise information presented in a language that parents can understand and assimilate. As a result, clinicians should be educated and prepared to counteract anti-vaccination sentiments. Health officials should make additional efforts to promote the benefits of vaccination while emphasizing the risks of non- or late pediatric immunization.

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