

Knowledge, Attitude, and Practice Toward Varicella Vaccine Among Families: A Systematic Review

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Abstract

Background: The World Health Organization (WHO) recommends implementing universal varicella vaccination in countries where varicella provides an important burden under conditions that can ensure reaching and sustaining high coverage of more than 80%. Parents and caregivers play a crucial role in improving vaccine uptake and protecting children from varicella infection. **Objective:** This review aimed to provide a comprehensive overview of knowledge, attitudes, and practices regarding varicella and its vaccination among parents and caregivers. Understanding these factors is important for identifying determinants of vaccine hesitancy and strategies to improve vaccination coverage. **Methods:** A systematic literature search was conducted using relevant keywords in ScienceDirect, Scopus, PubMed, and SpringerLink for studies published between 2015 and 2024. Data from eligible studies were reported descriptively. **Results:** Ten studies were included in the review. Six studies were conducted in high-income countries. Most participants were parents or expectant parents, and data were primarily collected through self-administered surveys. Overall, studies reported low levels of knowledge regarding varicella and its vaccination, while approximately half demonstrated positive attitudes toward vaccination. Several countries also showed a low varicella vaccination coverage. Factors most commonly associated with knowledge, attitudes, and practices included caregiver education level, information sources, personal beliefs, and healthcare provider recommendations. **Conclusion:** Caregivers generally demonstrated limited knowledge, moderately positive attitudes, and moderate vaccination coverage. Strengthening public health campaigns and healthcare communication regarding the risks of varicella may improve knowledge, attitudes, and vaccination practices.

Keywords: Knowledge; Attitude; Practice; Varicella; Vaccine.

1. INTRODUCTION

Varicella (chickenpox) is the result primary infection with varicella zoster virus (VZV). After varicella, VZV remains latent in the sensory-nerve ganglia and can reactivate later, causing herpes zoster (shingles) (1). Varicella-associated complications can be frequent, thereby impacting quality of life, and healthcare resource utilisation and budgets. Skin-related and infection-related complications were commonly observed, which is in line with the Centers for Disease Control and Prevention's findings that these are the most frequently occurring complications in children (2). Varicella vaccine was licensed for general use in Japan and Korea in 1988, and in the United States in 1995 for persons age 12 months or older (1). Varicella can occur in unvaccinated persons and vaccinated persons. Complications of varicella include bacterial superinfection of lesions, cerebellar ataxia, Reye's syndrome, thrombocytopenia, even deaths. The presentation of varicella is most commonly atypical and milder in a vaccinated person (3).

Before the introduction of varicella vaccination in the United States, varicella was endemic, causing approximately 4 million cases annually, with about 90% occurring among children younger than 15 years (1). Varicella incidence decreased after the vaccination. Results from two studies in the Republic of Korea and China shows that a slight decrease in the number of outbreaks in 2019 and fell sharply in 2020. The outbreaks

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rates showed a decreasing trend over the years until 2022 (4,5). Parents and caregivers play a crucial role in improving varicella vaccination coverage; however, doubts about vaccine necessity and limited awareness often lead to the perception that varicella is less important than other infectious diseases (6,7). To help address this gap, this comprehensive review will identify parental or care givers knowledge, attitude, and practice related to chickenpox and varicella vaccination. Which can be integral to understanding the factors associated with and how to overcome vaccine hesitancy and coverage.

2. METODE

Design

Methods are reported according to the Preferred Reporting Items for Systematic Reviews and Meta Analysis (PRISMA) checklist.

2.1 Data Source and Search Strategy

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Literature searches were performed in ScienceDirect, Scopus, PubMed, and SpringerLink for articles published between 2015 and 2024. The search strategy used the keywords: “Knowledge” OR “Attitude” OR “Practice” AND “Varicella vaccine”, and articles were retrieved between November 1 and November 11, 2024.

2.2 Eligibility Criteria

Studies were included if they reported participants’ knowledge, attitudes, practices, or associated factors related to the varicella vaccine. Reviews, conference abstracts, editorials, non-English publications, studies involving health professionals, and studies focusing on non-National Immunization Program (NIP) vaccines without addressing varicella vaccination were excluded.

2.3 Study Quality Assessment

The quality of eligible studies was assessed using the Center for Evidence-Based Management (CEBMA) checklist for cross-sectional studies, with responses categorized as “Yes,” “No,” or “Can’t tell” to evaluate potential bias.

2.4 Data Extraction

Data extraction was conducted using two standardized forms. The first collected general study characteristics, including location, design, setting, instruments, sample characteristics, and sample size. The second extracted study findings related to knowledge, attitudes, practices, and associated factors regarding varicella vaccination.

2.5 Data Analysis

A descriptive analysis was performed. Knowledge was assessed based on participants’ understanding of varicella disease and vaccination, attitudes reflected support or willingness to vaccinate, and practice was measured by varicella vaccination uptake or coverage.

3. RESULTS

3.1 Search Outcomes

A total of 514 articles were identified through searches of four databases. After removing 262 duplicate and ineligible records, 252 articles remained for screening. Of these, 208 were excluded during title and abstract screening, and 33 were excluded after full-text assessment. Ultimately, 10 studies met the inclusion criteria and were included in this review (Figure 1). Additional hand-searching and snowballing of relevant references were conducted; however, no further eligible studies were identified.

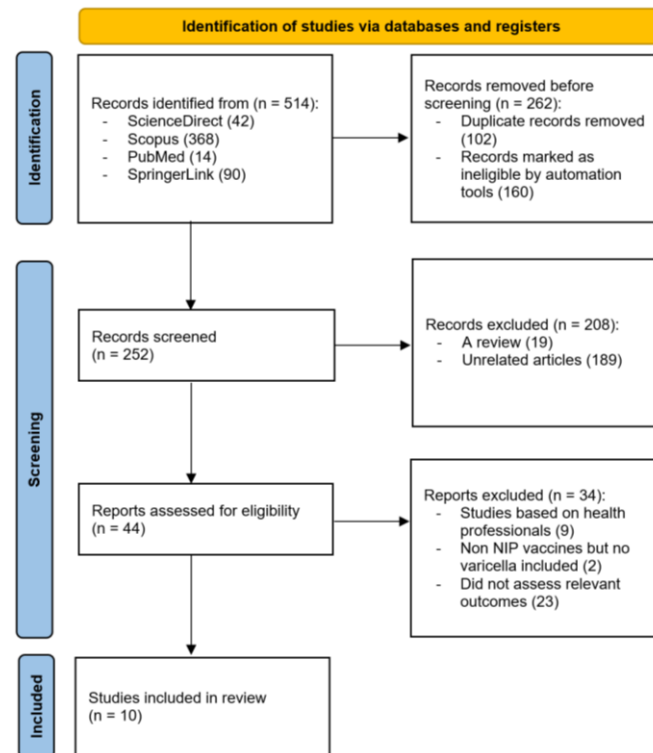


Figure 1. PRISMA Flow Diagram

The critical appraisal is summarised in Table 1. The table presented the quality of studies related to the research question. Critical appraisal identified limitations related to recruitment strategy (8–10) and sample size (8,9), failed in response rate (8,9). Only a few studies conducted validity and reliability test of questionnaires (11–13). Several studies not assessed statistical significance (8,14) and confidence intervals (8,9).

Table 1. Critical Appraisal of Cross-Sectional Study (Survey) Using CEBMa

Appraisal Questions	Foley (2021)	Huber (2020)	Zhou (2023)	Rosso (2019)	Hu (2017)	Vezzosi (2017)	Khalifa (2024)	Arnheim-Dahlström (2021)	Sherman (2023)	Tam (2015)
Q1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Q2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Q3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Q4	Yes	No	No	No	No	No	Yes	No	Yes	No
Q5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Q6	No	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes
Q7	No	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes
Q8	Can't tell	Can't tell	Can't tell	Yes	Yes	Yes	Can't tell	Can't tell	Can't tell	Can't tell
Q9	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Q10	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Q11	No	No	No	No	No	No	No	No	No	No
Q12	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

3.1 Characteristic of Included Studies

Based on Table 2, all of the included studies were conducted in seven different countries (United States, Hungary, China, Italy, Libya, Sweden, UK). Six studies were conducted in high income economies countries, while 4 studies in upper-middle income economies countries. The country classification was based on World Bank Group Country Classification by Income Level 2024-2025 (15). Three countries have included varicella vaccine in their national immunization program (NIP), meanwhile 4 countries have not included it in NIP or currently being reviewed for inclusion. Healthcare (hospital/clinic) and community were most settings used in the studies, only two studies conducted in school setting (kindergartens/primary schools). All included studies were cross-sectional and self-developed questionnaire. Methods included self-administered surveys (50%),

online surveys (30%), and face-to-face interviews (20%).

Participants were mostly parents (mothers/fathers/both) or soon to be parents (pregnant women), only two studies also had other caregiver participants (grandparents/guardians). Half of the included studies had >1000 participants to generalize of findings, improved accuracy of estimates and statistical power.

Table 2. General Characteristics of the Studies

Characteristics	n
Study Country	
Asian	
China	3
Non Asian	
United States	1
Hungary	1
Italy	2
Libya	1
Sweden	1
UK	1
Immunization Program Status	
NIP	3
Non NIP	4
Study Location	
Healthcare	4
School	2
Community	4
Data Collection	
Self-administered survey	5
Face-to-face interview	2
Online survey	3
Sample	
Parents	7
Soon to be parents (pregnant women)	3
Other caregivers	2
Sample Size	
<100	1
100 – 500	2
500 – 1000	2
>1000	5

3.2 Knowledge, Attitude, Practice, and Determinants of Varicella Vaccine

Knowledge, attitude, and practice (KAP) of chickenpox and varicella vaccine were summarised in Table 3. Mostly studies assessed knowledge of varicella disease (chickenpox), attitude of varicella vaccination, practice shown as coverage of vaccination. The KAP were assessed with various method of measurements. Most studies assessed knowledge with a “Yes or No” questions and rows of other “True or False” questions related. The attitude were assessed using “Agree, Disagree, or Uncertain” questions or using likert scale (5 points/10 points).

The average knowledge found in this review was low (<50%), some heard about varicella and its vaccination but answered incorrectly. The source of information mostly from health care providers (general practitioners, practice nurses, and pharmacists), followed by family or friends. Half of the studies have positive attitude toward varicella and its vaccination as the participants anticipated and likely to vaccinate their child. Other half of studies described that negative or less favorable attitude because the uncertainty of it as a way to protect their child. More than 50% of their children have been vaccinated for varicella. The low vaccine coverage was found in Sweden and UK based on (10,14).

Table 3. KAP of Varicella and Its Vaccination

No	Author, Year, Country	Knowledge	Attitude	Practice
1	Foley et al, 2021, United States	NA	Most respondents (67; 91.7%) expressed their intention to adhere to the CDC childhood vaccination guidelines for their current and future children	NA
2	Huber et al, 2020, Hungary	NA	A total of 487 parents (46.7%) reported that they chose not to vaccinate any of their children against varicella	More than half of the parents (555; 53.3%) had vaccinated at least one child against varicella, whereas 482 (46.3%) reported complete varicella vaccination among all their children
3	Zhou et al, 2023, China	Knowledge was highest among local urban children and caregivers, followed by migrant, non-left-behind, and left-behind groups	NA	85.7% for varicella vaccine and highest among local urban children.
4	Rosso et al, 2019, Italy	The average knowledge score in the sample was 3.9 ± 2.1 (calculated on a total of eight items and 421 respondents).	Highest rates of uncertainty regarding the benefit of vaccination for varicella immunization 64.1% (237/370) and 26.5% (112/422) of women indicated that they did not intend to vaccinate their children with the anti-varicella vaccine.	NA
5	Hu et al, 2017, China	Most participants had heard of varicella vaccination (76.5%) and were aware of its availability (66.8%), but only 13.5% correctly knew that the complete vaccination series requires two doses.	The overall perceived utility towards vaccination as a way to protect their child was 7.7 points on a 1 to 10 scale in average.	The VarV1 coverage among children from present pregnancy of participant women was 83.5%, despite not being available free of charge.
6	Vezzosi et al, 2017, Italy	Participants demonstrated poor knowledge, with only 26.6% correctly identifying the vaccine's availability and required dosage schedule.	The overall perceived benefit of vaccination for child protection was low	NA
7	Khalifa, 2024, Libya	33.3% of the Libyan mothers have a good knowledge about chickenpox and its vaccination.	NA	80% of the respondents had vaccinated or had intension for vaccination their children against chickenpox.

8	Arnheim-Dahlström, 2021, Sweden	65% of Swedish parents were aware that vaccination was possible.	Attitudes toward varicella vaccination were positive, with 85% of parents willing to vaccinate their child if it were included in the National Immunization Program (NIP).	Only 15% of parents had vaccinated their child against varicella.
9	Sherman et al, 2023, UK	Over half agreed that varicella could cause serious complications.	Most respondents (65.6%) indicated willingness to accept varicella vaccination if provided as part of a combination vaccine at 12 months of age.	Only 8.2% participants had the chickenpox vaccine for their child.
10	Tam et al, 2015, China	9.1% were very adequate and 28.3% adequate in terms of knowledge.	For respondents with unvaccinated children, only 3 out of 10 statements obtained median scores of 5 (more negative or less favorable).	69.0% (1881) were reported to have been vaccinated against varicella.

Note: NA (Not Available)

Correlation and determinants of knowledge, attitude, and practice are shown in Table 4. A good level of knowledge and attitude were associated with the vaccination practice. In addition to that, the most significant factors associated with knowledge are caregiver's education level and sources of information. The main sources of information is healthcare provider, such as general practitioner, nurse, or pharmacist. Public health experts, healthcare professionals, and individuals who support vaccination can contribute to reducing misinformation by addressing and correcting inaccurate information shared online (16).

Education level, occupation, and household income also showed significant result in caregivers' knowledge, attitude, and practice toward varicella vaccine. According to Social Determinant of Health (SDH) framework, these three factors do not act individually. They create a cumulative effect on health, education leads to better occupation, occupation provides higher income, and income allows for the purchase of health-related goods and better material circumstances (17). While the personal beliefs on the vaccine benefit is the most factor associated with attitude and practice.

Table 4. Determinants of Varicella Vaccine

No	Author, Year, Country	Correlation		Determinants		
		Knowledge and Attitude Toward Practice	Knowledge Toward Practice	Knowledge	Attitude	Practice
1	Foley et al, 2021, United States	NA		NA	NA	- Recommendation by provider - Personal beliefs
2	Huber et al, 2020, Hungary	NA		NA	- Living area	- Personal beliefs
3	Zhou et al, 2023, China	NA	An inverse relationship between immunization knowledge and vaccination coverage was observed among local urban and left-behind families	- Sources of information	- Migration type	- Children's age - Caregiver's age - Family role

4	Rosso et al, 2019, Italy	A higher level of knowledge and positive attitudes towards the efficacy, safety, and delivery of vaccine were associated with the intention to vaccinate.	NA	<ul style="list-style-type: none"> - Sources of information - Education level - Parent's age 	<ul style="list-style-type: none"> - Personal beliefs on benefit and quality - Experience of side effects 	<ul style="list-style-type: none"> - Personal beliefs on benefit and quality
5	Hu et al, 2017, China	NA	NA	<ul style="list-style-type: none"> - Parent's age - Education level - Household income 	<ul style="list-style-type: none"> - Parent's age - Education level - Household income 	<ul style="list-style-type: none"> - Immigration status - Number of children
6	Vezzosi et al, 2017, Italy	NA	Respondents with good knowledge had an almost 5 times greater odds of vaccination than nonknowledgeable respondents (95% CI 2.42–9.12).	<ul style="list-style-type: none"> - Education level - Sources of information 	NA	<ul style="list-style-type: none"> - Parent's age - Number of children
7	Khalifa, 2024, Libya	NA	Practice of mothers about vaccinated their children have a clear statistical significance and correlation with their knowledge of varicella disease and it is vaccination ($p = 0.004$) but no association with their perception.	<ul style="list-style-type: none"> - Occupation 	<ul style="list-style-type: none"> - Recommendation by provider 	NA
8	Arnheim-Dahlström, 2021, Sweden	NA	NA	<ul style="list-style-type: none"> - Parent's gender - Education level - Living area 	<ul style="list-style-type: none"> - Personal beliefs - Household income 	<ul style="list-style-type: none"> - Occupation
9	Sherman et al, 2023, UK	NA	Higher knowledge about varicella complications has a positive association with stronger vaccination intention (R^2 change = 0.054).	NA	<ul style="list-style-type: none"> - Personal beliefs 	<ul style="list-style-type: none"> - Personal beliefs
10	Tam et al, 2015, China	Greater perceived knowledge and attitudes of varicella was significantly associated with positive vaccination.	NA	<ul style="list-style-type: none"> - Education level - Family income 	<ul style="list-style-type: none"> - Personal beliefs 	<ul style="list-style-type: none"> - Willingness to pay - Recommendation by provider

Note: NA (Not Available)

4. DISCUSSION

Most of the reviewed studies were conducted in Non Asian. These setting area were aligned with (18), varicella used to be very common in the United States (US) and contributed significantly to the burden of childhood disease. Epidemiological and economical burden studies of varicella have shown that complications following

natural varicella were skin infections, followed by neurologic and respiratory disease. Varicella imposes a substantial economic and health burden due to costs associated with medication, outpatient care, hospitalization, and intensive care. This burden can be reduced through cost-effective vaccination programs. The Advisory Committee on Immunization Practices (ACIP) recommends routine varicella vaccination for children aged 12–18 months, catch-up vaccination for susceptible children up to 12 years of age, and vaccination of high-risk susceptible individuals. Licensed vaccines include the single-antigen varicella vaccine (Varivax) and the combined measles-mumps-rubella-varicella (MMRV) vaccine (22).

Studies in the United States (1996–2020) showed that one dose of varicella vaccine provided 82–85% protection against varicella of any severity and 100% protection against severe disease, while a two-dose schedule increased effectiveness by at least 10% (23). Despite the vaccine's effectiveness, caregiver knowledge of varicella and its vaccination remained low, consistent with findings that parents often perceive chickenpox as a mild childhood illness with minimal risk of complications (7). Parents showed limited awareness of the potential complications of chickenpox and its vaccination, while those with higher education and socioeconomic status demonstrated greater engagement with health information (14). Public health campaigns and healthcare professionals should emphasize the potential serious complications of chickenpox and the benefits of vaccination.

Although parental knowledge of varicella vaccination was generally low, approximately half of the studies reported positive attitudes and willingness to vaccinate children against chickenpox. Negative attitudes were mainly driven by perceptions that vaccination was unnecessary, concerns about side effects, doubts about vaccine effectiveness, lack of information, and vaccine cost, while higher knowledge levels were consistently associated with greater intention to vaccinate (9,10,13,24). This may explain why half of the studies still have negative attitude toward vaccination. Because the factors that affect acceptance attitudes towards vaccination were influenced by risk-coping beliefs, as well as trust in the medical background of information sources (25).

Practice of varicella vaccination were found to be decent, but low coverage in UK and Sweden. These results were confirmed by (26) review, that varicella vaccination coverage in western pacific, europe, americas, eastern mediterranean were high (over 80%). However the coverage in japan still low. National immunization program (NIP) as one of the national health priority programs with the aim of improving maternal and child health, accelerating nutrition improvement, and improving vaccine preventable disease (VPD) control (27). As of 2021, varicella vaccination was included in the National Immunization Program (NIP) of 14 European countries. In contrast, several countries, including India, Indonesia, and Thailand, had not adopted it, and only a few countries in the Western Pacific region had implemented universal varicella vaccination (UVV). The United Kingdom has also not included varicella vaccination in its NIP, citing the perception of varicella as a mild disease and concerns regarding cost-effectiveness (26). This review should be interpreted cautiously due to its inclusion of only English-language studies from seven countries and the exclusion of unpublished or inaccessible studies, which may have introduced publication and reporting bias.

5. CONCLUSION

Most caregivers knowledge in seven countries (United States, Hungary, China, Italy, Libya, Sweden, UK) was low, half of the studies have positive attitude, and some countries found to be low in coverage of varicella vaccination (UK and Sweden). Despite insufficient knowledge, most caregivers remained willing to accept varicella vaccination for their children. Furthermore, greater caregiver knowledge was positively associated with a stronger intention to vaccinate their children.

This review identifies healthcare professionals as one of the most trusted sources of information, as well as caregivers' beliefs that varicella vaccine is unnecessary. Including information on the potentially severe complications of varicella in public health campaigns and providing evidence-based counseling by healthcare professionals may help improve knowledge, attitudes, and practices regarding varicella vaccination.

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CONFLICT OF INTEREST

The author declares no conflict of interest or personal relation that could have appeared to influence the studies reported in this review.

DAFTAR PUSTAKA

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