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Global Mapping of Evidence on Vaccination Related Education Through School Based Curriculum:

A Systematic Scoping Review

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Abstract

Background: Educating school children about vaccination as a part of health promotion intervention is one of the strategies to improve vaccination acceptance. The aim of this scoping review is to describe the range of school-based education interventions related to vaccination and particularly about efforts to include such education in school curricula. **Methods:** This systematic scoping review was conducted based on the methodological framework proposed by Arskey and O'Malley. Searches were performed in four databases from Nov 1, 2004 to Nov 30, 2024. Databases were systematically searched for published articles on school education on vaccination. Two independent authors screened the articles followed by data extraction using MS-Excel tool. **Results:** Out of total identified 18,706 articles, only six articles met the inclusion criteria. All studies were focused on developed countries and most were experimental studies. Interventions were delivered by teachers or researchers and reported general improvements in vaccine knowledge as well as of vaccine-specific interventions. This review documented the outcomes on a curriculum based on immunity and vaccine related concept in school education. The review also highlights the ad hoc approach of health promotion during the vaccine specific knowledge dissemination in school. **Conclusion:** Formalizing health education could be a long-term strategy for better public health outcomes which face numerous challenges due to vaccine hesitancy or denial. Structured school curriculum on vaccination is warranted to sustain the knowledge on vaccination and its effect on community.

Introduction

Vaccination has played a pivotal role in advancing public health, leading to the complete eradication of smallpox and the near elimination of poliomyelitis, with only a few countries still reporting cases.[1] It is estimated that immunization programs prevent between 3.5-5 million deaths annually by protecting against diseases such as diphtheria, tetanus, pertussis (DPT), and measles.[2] Furthermore, vaccination contributes to the prevention of numerous future fatalities among older populations, exemplified by hepatitis B immunization, which is projected to avert approximately 600,000 deaths each year.[3] Recently, as a response to the COVID Pandemic, COVID vaccination has saved an estimated 2.5 million lives globally and 14.8 million life years.[4] This is partly due to the growing number of infectious diseases that are now recognized as preventable through vaccination.

In 1978, the World Health Organization (WHO) launched the Expanded Programme on Immunization (EPI) focusing on preventing children from vaccine preventable diseases (VPDs).[5] Beginning in 1978, India introduced the first national immunization programme, which has made significant strides in ensuring that children and pregnant women are protected against VPDs. The Universal Immunization Programme (UIP) was introduced in 1985 and designed to provide comprehensive vaccination coverage for all children and pregnant women across the country.[6]

With the introduction of new vaccines such as DPT, Hepatitis B Vaccine, Haemophilus Influenzae type B (Hib), Polio, Measles-Rubella Vaccine, Pneumococcal Conjugate Vaccine, Rotavirus Vaccine, and the Human Papillomavirus Vaccine against vaccine-preventable diseases, mostly across developing countries such as India, Bangladesh, Nepal, Maldives, Bhutan, DPR Korea, Bhutan, Maldives, Timor-Leste and Sri Lanka, and improvements in vaccine coverage, a larger cohort of population has been protected against a wider range of infectious disease, and has eliminated smallpox, polio, maternal and neonatal tetanus, and measles-rubella.[7,8] With these advancements, vaccination has the capability to achieve the Sustainable Development Goal (SDG) Target 3.b: “Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines” in alignment with the Immunization Agenda 2030.[9,10] Despite these efforts, nearly 14.5 million children globally missed out any vaccination: zero-dose children.[11] The global coverage of first dose of a measles vaccine has seen a reduction to 83% in 2023, down from 86% in 2019, DPT-3 coverage stood at 84%, and HPV Vaccine coverage in girls was 27% in 2023.[11]

Low-to-middle income countries such as India continue to face challenges in reaching the target of "leaving no child behind" and ensuring child immunization coverage of 90% or greater.[12] However, recent data from the WHO and Unicef Estimates of National Immunization Coverage (WUENIC) report reveals a concerning 2% increase in the number of zero-dose children in India, indicating a severe immunity gap within the community.[13] Additionally, outbreaks of diseases like measles and diphtheria have been reported in certain regions, highlighting the gaps that persist in immunization coverage.

A significant barrier to achieving universal immunization is vaccine hesitancy and avoidance.[14] Vaccine refusal, particularly in rural and underserved areas, has become a growing concern. Vaccine hesitancy is a complex issue influenced by various factors, including misinformation, cultural beliefs, and a lack of understanding about vaccine safety and efficacy.[15] Learnings from a recent COVID-19 vaccination programme in India which administered 220 vaccine doses during pandemic paved a strengthened way for life course immunization across the globe.[16] However, addressing vaccine hesitancy requires continued effort, including understanding the perceptions of vaccine-refusing communities and improving their knowledge about the benefits of immunization. In recent years, various strategies have been implemented to address the challenges of vaccine hesitancy within communities to improve vaccination demand, with a particular focus on health promotion services provided through schools.[17–19]

Evidence from multiple countries reported the uptake of school-based programs for multiple public health issues such as nutrition education,[20] oral health programs,[21] diet and sugar supplementation, school feeding, and school education.[20] School curriculum can also be utilized to instill knowledge of benefits of vaccines through health education, thereby increasing demand of vaccine in the community. With this background, we wanted to summarize the global

evidence available which utilized the school-based curriculum as a platform for vaccination education among school going children population in an effective way.

Methods

Objective

The purpose of this review is to examine the various interventions designed to increase the knowledge and awareness of school going children, parents and teachers through school-based curriculum regarding the benefits of vaccination, as well as to summarize the component of the interventions. Additionally, the paper also explored the efforts made to integrate this knowledge into formal educational content, either as part of the curriculum or through teacher training programs.

We followed the Arksey and O'Malley's framework, which has been further refined in accordance with Levac, et al. and the Joanna Briggs Institute.[22] As per the Arksey and O'Malley's framework, the five stages for conducting a scoping review are:

1. Identification of research question
2. Identifying relevant studies
3. Study selection
4. Charting the data
5. Collating, summarizing and reporting the results

Stage 1: Identification of the Research Question

All team members (BK, KS, PB and AV) were involved in the brainstorming sessions for identification and finalizing the research question. As per the terminologies addressing school health programmes for vaccination, the following research questions were developed:

- **Descriptives**

  How much evidence is available to enhance the knowledge and awareness of children, teachers, and parents in schools about vaccines and vaccination?

  Where is the evidence available as per WHO region classification?

- **Population/Study Design**

  What are the characteristics of the targeted populations?

  What are the study designs and research methods used for generating evidence on improving knowledge and awareness in schools on vaccines and vaccination?

- **Interventions**

  What type of interventions are documented for enhancing knowledge and awareness in schools on vaccines and vaccination among stakeholders?

  What is the duration of these interventions?

- **Comparators**

What are the characteristics of the comparator group (if any)?

- **Outcomes**

  What are the outcomes of such interventions in terms of knowledge and awareness about vaccines and vaccination among study population?

Additionally, this scoping review also documents any attempts made to make such knowledge content formalized as a part of curriculum or training.

Stage 2: Identifying Relevant Studies

As per the Arksey and O'Malley's framework, this stage includes the identification of available evidence. The search was conducted in accordance with Medical Subject Heading (MeSH) terms and associated keywords. The search strategy was developed in consultation with a subject matter expert and included a wide reach of relevant keywords. A search query (table 1) was developed for PubMed and was reciprocated in other databases such as Scopus, Web of Science, and EBSCOhost. These databases were selected due to accessibility through authors' organizations and were comprehensive in including information on school health programmes for vaccination. The search was carried out on December 3, 2024 for the period from November 1, 2004 to November 30, 2024. Only English language literature was included in this scoping review. The reference list of included studies was also searched for potential inclusion.

Table 1. PubMed Based Search Strategy

Search No.	Search Strategy
#1	Students OR School student OR school children OR child OR children OR teacher OR adolescent OR parents OR mother OR father OR school OR college OR young adult
#2	Vaccine OR Vaccines OR vaccination OR immunization OR immunization drive OR immunization campaign OR school-based vaccination OR adolescent vaccination OR vaccination programme OR vaccination training OR vaccination programme curriculum OR vaccination programme curricula OR vaccination chapter OR vaccination textbook
#3	Global OR all countries
#4	#2 and #3
#5	#1 and #4

Items and Search Terms

- **Population:** Students, school student, school children, child, children, teacher, adolescent, parents, mother, father, school, college, young adult
- **Concept:** Vaccine, vaccines, vaccination, immunization, immunization drive, immunization campaign, school-based vaccination, adolescent vaccination, vaccination programme, vaccination training, vaccination programme curriculum, vaccination programme curricula, vaccination chapter, vaccination textbook
- **Context:** Global, all countries

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Inclusion Criteria

1. Primary studies related to higher classes or vaccine specific publications (i.e., HPV vaccine) were included.
2. Interventions in school students, teachers, and/or parents related to their knowledge enhancement for vaccines or vaccination were included.
3. Efforts to increase the knowledge of the students/teachers/parents on vaccination during the program interventions were also made part of this review.
4. Only English language literature are included in this review.

Exclusion Criteria

1. Secondary studies, books, case studies, conference material and dissertations were excluded.
2. Studies in school related to program interventions like vaccination which do not have any component of knowledge enhancement of student, teacher or parent were excluded.
3. Vaccine or vaccination related studies not related to school students' knowledge enhancements were excluded.

Stage 3: Study Selection

The identified studies were exported to the Rayyan.ai software. These studies were screened at two stages. A title and abstract (Ti-Ab) screening by BK and AA, and full text screening done independently by PB and AV. Disagreements on inclusion/exclusion at the Ti-Ab and full text screening stage were resolved through arbitration by a third author (PB and KS, respectively). The study selection and screening process is summarized in figure 1.

Figure 1. PRISMA Flow Chart of Study Identification

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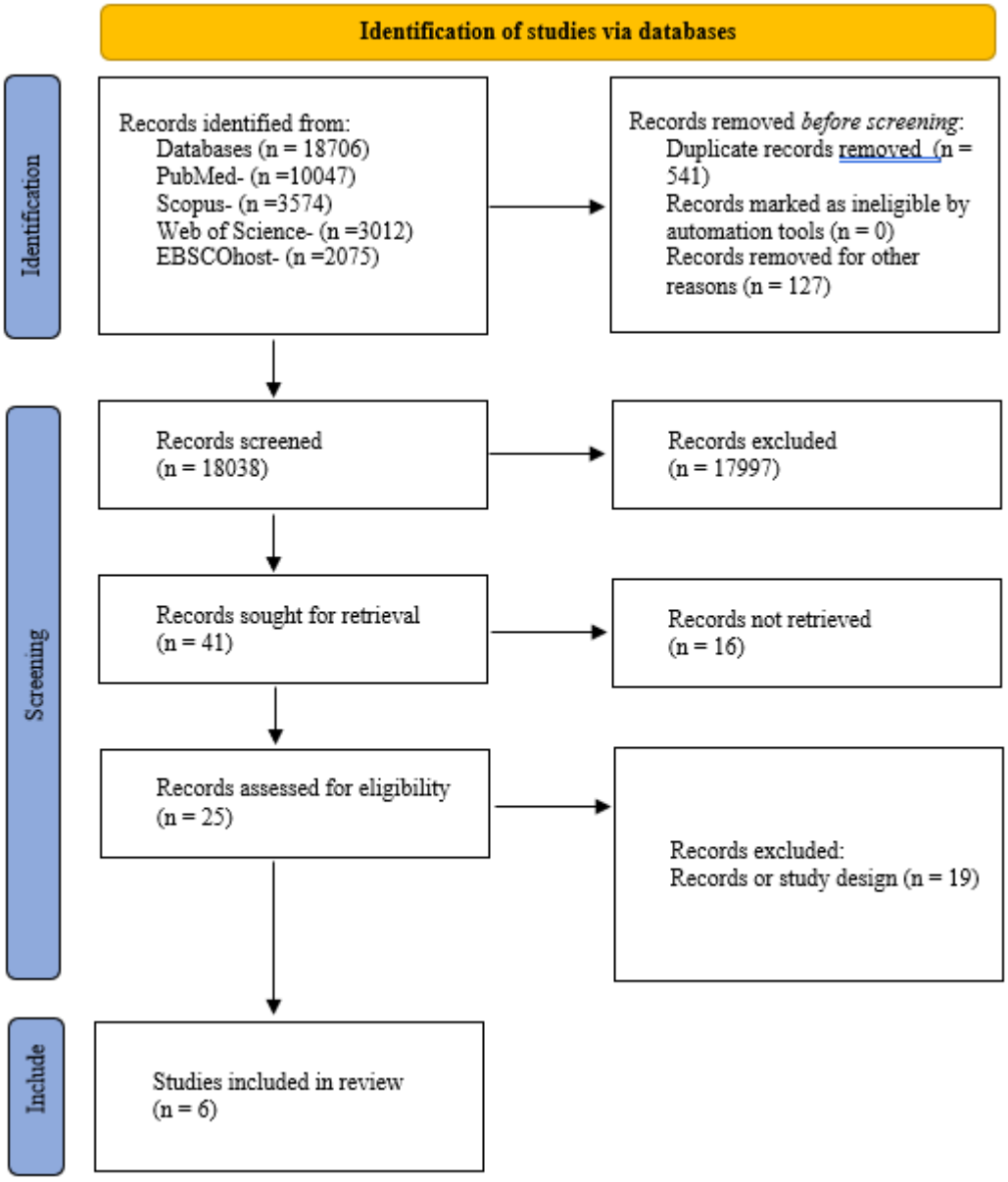

Stage 4: Charting the Data

An MS-Excel based data extraction tool was developed in consultation with all five authors. Extracted information included study title, authors, publication year, country as per WHO Region classification, journal name, purpose, methods and study population, age group (if given), study design, sampling method, sample size, intervention, mode and frequency of intervention, comparison group, outcome relation to knowledge and awareness about vaccines and vaccination. Specific data were extracted independently by two authors (AV and BK) from full-text articles included in the final sample. Disagreements between reviewers were handled by consensus and, when agreement was not reached, a final decision was made by a third author (AA). Due to the heterogeneity of the study methods, populations and objectives, meta-analysis was not appropriate for this review.

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Critical Appraisal

All studies were critically appraised through Joanna Briggs's critical appraisal tool by two independent authors (AV and KS). The disagreements were resolved by the third author (BK).

Stage 5: Collating, Summarizing and Reporting the Results

From the findings of included studies, the narratives and descriptive summaries were developed in the report formats based on the JBI reviewer manual recommendation. The summary tables were developed to study characteristics such as study design, sample size, intervention components etc. Other vital and relevant findings were also presented in the tabular format with suitable charts.

Results

The search from multiple searches resulted in 18,706 studies. Based on our eligibility criteria, 18308 studies were screened through title and abstract screening and 25 studies were screened through full text screening (figure 1).

Study Characteristics

Table 2 summarizes the characteristics of the included studies based on the country, domain of the study area, and the primary objective of the study. All included studies were conducted in developed or high-income countries based on the world bank classification: three studies were conducted in USA and Canada, one each in Europe (France) and The Netherlands, and a single study in Australia.[29] Interventions based on HPV vaccination was the domain of focus on two studies, multiple vaccination in a single study, and viral infection and Hep B vaccination was a focus area in other studies.

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Table 2. Study Characteristics

Study ID	Country	WHO Region	Study focus domain	Study Objective
Bocquier et al[23]	France	EUR[i]	HPV	To describe the development process of the Pre HPV intervention using the Guidance for reporting of intervention Development framework as a guide.
Gargano et al[24]	USA	AMR[ii]	Adolescent vaccination-Tdap, HPV, MCV4 and Influenza Vaccine	To determine the effectiveness of two interventions designed to enhance adolescent vaccination rates among a sample of adolescents attending middle or high schools.
Glik et al[25]	USA	AMR	Vaccination	To raise middle school student awareness, attitudes, and proactive behaviors about immunization, and to increase immunization rates among middle school students through implementation of a comprehensive integrated immunization promotion curriculum (Immunization Plus!)
Broman et al[26]	Canada	AMR	HPV Vaccine	To identify opportunities for HPV vaccine education in BC School-based immunization programs by exploring the perspectives of students, parents, school staff, and public health nurses on current School-based immunization programs.
Shocker et al[27]	The Netherlands	EUR	Viral Infection	To study to what extent Viruskenner- International education module creates conditions in which empowerment processes can arise and take place.
Skinner et al[28]	Australia	WPR[iii]	Hepatitis B vaccination	To evaluate a specifically designed hepatitis B Educational promotion curriculum package as part of a successful hepatitis B vaccination delivery system to adolescents.

[i]The European region [ii]The region of the Americas [iii]Western Pacific region

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Study Methodology

Table 3 provides a summary of the characteristics of the studies included.

Table 3. Study Methodology

Study ID	Study design	Study duration	Study population	Age group	Participant gender	Sampling method	Sample size
Bocquier et al	Mixed Methods design	16 months	Adolescents attending middle schools	11 to 14 years	NA	NA	17
Gargano et al	3-Armed Randomized Control Trial	24 months	Adolescents	Adolescents	Both	Randomization	667 middle school 401 high school students
Glik et al	Quasi experimental study	24 months	Middle school students	10 to 12 years	Both	Non-equivalent comparison-groups design with a lagged baseline component	678 students from 48 classroom in 22 schools
Broman et al	Qualitative study with Semi structured Focus Group Discussion	7 months	Grade six student	11–12 years	All	Purposive sampling	80 participants; 49 students
Shocker et al	Qualitative study	3 months	Students	11-12 years	Both Male and Female	NA	10 Students from 2 primary schools
Skinner et al	Randomized Controlled Study	NA	Adolescents and Schools	7 years	Both Male and Female	Randomization	925 students from 48 schools

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Study Design and Duration

Among them, two studies follow a randomized study design, while two others adopt a qualitative study design. Additionally, one study employs a mixed-methods approach, and another is a quasi-experimental study. The duration of the studies varies significantly, ranging from 3 months to 24 months. Specifically, studies conducted by Gargano[24] and Glik[25] lasted 24 months, while Bocquier[23] reported a duration of 16 months, Broman[26] reported 7 months, and Shocker[27] reported 3 months. Skinner[28] did not specify its study duration.

Study Population

Most of the studies were conducted among adolescent populations, with the exception of the study by Skinner, which included participants as young as seven years old. Almost all studies also involved parents. Many studies included both male and female participants, although Bocquier, did not specify any gender.

Sample Size

The sample size varied considerably, ranging from 10 participants (Shocker) to 925 participants (Skinner).

Intervention Characteristics

Interventions were largely focused on improving the knowledge about the infections, their prevention, and vaccination (five studies); a single study was focused on identifying the opportunities for HPV Vaccine education. Five studies delivered the intervention face to face in school through teachers, and a single study delivered the intervention online through group sessions. Standard care or no intervention were provided among control groups in the studies conducted by Gargano,[24] Glik,[25] and Skinner.[28]

Intervention Description

Bocquier[23] developed a multifaceted intervention that included a handbook providing information on HPV infection and vaccination, complemented by an e-health platform featuring educational videos and interactive video games. Gargano[24] employed the Health Behavior Model to assess factors influencing vaccination decisions, including perceived susceptibility and severity of diseases, benefits and barriers to immunization, and the role of peers, media, and societal influences in the context of tetanus, diphtheria, pertussis, meningitis, influenza, and HPV vaccines. Glik[25] designed a classroom-based curriculum encompassing topics such as communicable diseases, immunization, the immune system, herd immunity, and individual and community health responsibilities. Similarly, Shocker[27] developed educational modules delivered through classroom instruction, aimed at identifying health risks and preventing viral infections. Skinner[28] implemented an educational initiative focused on Hepatitis B awareness, integrating immunization promotion through informational videos presented in school settings (table 4).

Table 4: Intervention Characteristics

Study ID	Intervention	Mode of Delivery	Frequency	Comparison	Intervention Description

Bocquier	Educational group sessions on HPV infections and vaccination	Online information group session using eHealth tools, videos, serious video games	Once	NA	Development multicomponent intervention including e health tools for students on HPV infection and vaccination and parents for promoting HPV vaccination.
Gargano	A science teacher–delivered intervention targeted to students. Information about how tetanus, diphtheria, pertussis, meningitis, influenza, and human papillomavirus	Class room teaching and questionnaire	Once	Standard care	Education intervention materials include: Threat (HBM) * Perceived susceptibility to disease * Perceived severity of disease Expectations (HBM) * Perceived benefits of vaccination * Perceived barriers to vaccination Cues to Action (HBM) * Social/Peer influences * Media, disease symptoms Self-Efficacy for Vaccination (HBM) Social Norms (TRA) * Injunctive norms * Descriptive norms
Glik	Immunization Plus! Curriculum including Immunization Day video Experimental conditions: (a) training of teachers in the curriculum followed by curriculum implementation; (b) curriculum implementation, without teacher training; (c) screening of the	Curriculum condition- In classroom	Once- 10 to 12 hours of classroom	Non-equivalent comparison groups	Total 5 thematic modules were developed: Communicable disease, Immunizations, the immune system, herd immunity, and personal and community responsibility of health. Information to young adolescents, their parents, and teachers about up-to-date adolescent immunization recommendations.

	Immunization Day video as the only intervention; and (d) no intervention.				
Broman	NA	Focus group discussion	NA	NA	This study was conducted to identify opportunities for HPV Vaccine education.
Shocker	Module which is implemented in a class for viral infection prevention	Semi structured interviews	Once	NA	VIRUSKENNER: 8-week module added in a curriculum consisting of a lecture to identify health risks and to develop an intervention to prevent a virus infection
Skinner	Hepatitis B education/ promotion kit	Teachers were provided with specific resource information and autonomy in teaching was encouraged. Specific teacher training was offered.	Over the weeks	458 intervention students and 467 control students	Curriculum-based school health programs- Hepatitis B education/ promotion kit which had 4 lessons, delivered to all year 7 students over the weeks leading to the first immunization. Teaching activities include resource factsheet, and an information video. Parents were accessed through homework assignment.

Outcomes Measured

Most studies evaluated the school going children's (aged 7 to 14 years) knowledge and attitude for diseases and vaccination, and improved vaccination coverage and health behaviors. The study conducted by Shocker[27] reported the need for empowering the adolescents through involvement in identifying health risks (table 5).

Table 5. Outcome Characteristics

Study ID	Primary Outcome	Secondary Outcomes
Bocquier	Adolescents knowledge, attitude and intention to get vaccinated	The development process of the PrevHPV school-based and primary care-based multicomponent intervention aimed at improving HPV vaccine coverage amongst French adolescents.

Gargano	Development of a theory based intervention to increase adolescent vaccination rates among middle and high school students	Increase vaccine-related knowledge and positive attitudes regarding vaccination among students and parents
Glik	Curriculum improved knowledge attitude of students	Knowledge about immunizations and communicable diseases. Attitude towards immunization. Improved Health-related behaviors
Broman	Adolescent students valued a SBIP curriculum that integrated their perspectives, met their needs, and engaged them.	The introduction of age-appropriate and fun learning resources for students was identified as a useful opportunity to improve vaccine knowledge. The following themes were emerged: *Theme 1: making SBIP curriculums student-centered* *Theme 2: adopting a collaborative and interdisciplinary approach to vaccine education* *Theme 3: actualizing parent education opportunities*
Shocker	Viruskenner is successful in creating the conditions needed for empowerment, processes to arise and take place to improve health behavior.	Involvement of students played a role in identifying health risks and how they preferred to approach and fulfil the assignment. A participatory setting and community involvement appeared to be the most important empowering elements in this education module. Viruskenner may contribute to improving health behaviour with regards to prevention of virus infections.
Skinner	Increased student knowledge about hepatitis B and more favourable attitude to vaccination did not have a significant effect on the uptake of vaccine.	The findings of this study indicate that a more comprehensive delivery strategy is required.

Discussion

Embedding vaccination education into school curricula as a long-term, sustainable strategy to address vaccine hesitancy and promote community-level demand for upcoming generations leads to intergenerational effects and making traditional ways (IEC, BCC, etc.) of demand less resource intensive. Educating children on immunity and vaccines at an early age can shape their lifelong health behaviors and position them as "vaccine messengers" in their communities. As these children grow into parents, their foundational knowledge can positively influence immunization decisions for the next generation—a lifecycle approach with both immediate and long-term benefits.

While health education has long been a core component of health promotion strategies, immunization-specific education targeted at school students remains limited. This scoping review summarized the evidence on health promotion interventions for immunization targeting

school going children and adolescents. Of the 14 studies reviewed, only six studies directly addressed school-based vaccination education; the remaining eight focused on vaccine education for other target groups such as pediatricians, medical and nursing students, and were thus excluded. The six relevant studies varied significantly in their approach but collectively represent the limited availability of literature directly engaging schools as a platform for strengthening immunization demand.

A study was conducted by Golan, et al[30] in 2018 in Israel delivered a universal wellness program through either a school-based setting or an out-of-school setting, which is comparable to the health promotion interventions which were delivered through both classroom teaching style interventions and online groups in the included studies. A policy paper on the school health programmes in Asia based on expert workshops discussed the strategy for the implementation of the WHO's Health Promoting School (HSP) framework. Based on this framework, findings of our scoping review reported the holistic approach through involving adolescents (students), teachers and parents in the health promotion activities through school-based curriculum.[31] Five studies implemented educational interventions or assessed stakeholder perceptions—students, teachers, and parents—with the aim of increasing vaccine uptake. Gargano, et al[24] in the United States developed and conducted a theoretical framework and initial evaluation of an intervention delivered by teachers over a 120-minute period, and supplemented with parent brochures. Multiple reciprocating relationships between education and health have been constructed by Broman, et al[26] in their study to identify opportunities for HPV vaccine education in school-based settings for grade 6 students in British Colombia:

- By making school-based programmes student-centered;
- Adopting a collaborative and interdisciplinary approach to vaccine education; and
- Actualizing parent education opportunities.

These findings from the USA and Canada reflect upon the steps taken in the region at a national level for increasing the awareness among children regarding immunization. These may be closely linked to findings from the states—including Delaware—wherein school-based vaccination requirements are strictly enforced, and all students must provide proof of immunization in line with Centers for Disease Control and Prevention (CDC) guidelines before enrollment in public or private schools. Delaware's approach, grounded in policy, surveillance, and public health partnerships, offers a relevant example of localized adaptation of global immunization strategies for school-age children.

An interesting finding has been reported in evidence generated by Vaivada, et al, wherein it was reported that schools can act as a vital platform for the delivery of the preventive intervention among adolescent population. These interventions were largely focused on infectious diseases, non-communicable diseases, and healthy lifestyles, nutrition, and physical activity.[17]

A review was conducted by Baltag, et al in 2015 with the aim of providing a global overview of the health services provided through schools in 102 countries. It reported more than 15 intervention or services provided; the top five interventions were vaccinations, sexual and reproductive health education, vision screening, nutrition screening, and nutrition health education.[32]

Among low-to-middle income countries such as India, schools have served as effective platforms for providing vaccination services during national campaigns—such as the Measles-Rubella

catch-up campaigns and the COVID-19 vaccination for children aged 12 and above.[33,34] These campaigns have demonstrated the cost-effectiveness and logistical advantage of school-based delivery.[35] However, these remain reactive, top-down interventions driven by public health emergencies and typically lack sustained educational components. A lack of a structured and class-wise curriculum in majority of countries has been seen—particularly with respect to immunization—that can systematically introduce or reinforce the importance of immunization across age groups. Even though primary-level students are expected to be sensitized about the importance of vaccination as a preventive measure, the actual implementation of the same to develop vaccine literacy remains limited.

Conclusion

This scoping review includes the evidence from a few countries that underscore the global relevance of this issue, but also reveals the limited efforts in developing comprehensive, school-based immunization education programs. A majority of evidence was skewed towards developed countries, and was limited to immunity and vaccination related formal education in school-based curriculums. The review also affirms that global efforts to integrate vaccination education into school curricula remains uneven. There is a compelling need for structured, curriculum-based interventions that could contribute significantly to the immunization goals (reducing zero-dose children, sustaining measles and rubella elimination, improving coverage of HPV, DPT, Td among school going groups).

High income countries and states like Delaware provide a valuable example of state-level commitment to immunization. The state's comprehensive requirements and collaborative public health partnerships contribute to higher-than-average coverage rates, though recent years have highlighted vulnerability to vaccine hesitancy and disruptions from global events. There appears to be no specific published studies that have directly assessed the impact of a vaccination awareness curriculum specifically implemented in Delaware schools for children to address vaccine hesitancy; adopting curriculum-based interventions tailored to vaccination in Delaware could further strengthen community immunity, mitigate exemption trends, and promote vaccine literacy.

Limitations

This scoping review was limited to the English language only, and may have missed non-English language papers. Additionally, the search strategy was run in November 2024; the authors could not run an updated search from the past 6 months. The authors intended to update the search at the completion of one year of searching.

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