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Original Research Article

A study to assess the knowledge, perceived roles and training needs of school teachers regarding human papillomavirus vaccination programs in selected schools of Dehradun, Uttarakhand, India

Neha Ali^{1*}, Sheeba Philip², Rajni³, Vandana³, Naveen³

¹Department of Obstetrical and Gynecological Nursing, Sai College of Nursing, Dehradun, Uttarakhand, India

²Department of Medical Surgical Nursing, Sai College of Nursing, Dehradun, Uttarakhand, India

³Sai College of Nursing, Dehradun, Uttarakhand, India

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*Correspondence:

Dr. Neha Ali,

E-mail: nehaa6065@gmail.com

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ABSTRACT

Background: Cervical cancer is a critical global health challenge, with India bearing over 22% of worldwide mortality. School teachers are vital, trusted stakeholders who can mitigate vaccine hesitancy and champion adolescent human papillomavirus (HPV) immunization. However, institutional frameworks rarely address teachers' internal educational deficits. This study evaluated the baseline health literacy, perceived roles, and training needs of school teachers in Dehradun, India.

Methods: A descriptive cross-sectional study was conducted among 110 school teachers across selected government and private schools named shri guru ram rai (SGRR) public school, Government Primary School, Charan Haly Child School, Floridale School, Government Girls Inter College (GGIC), Prabhanand Children Academy, Government Inter College, and Shivalik Hills Academy in Dehradun, Uttarakhand, India from Jan to June 2026 using convenience sampling. Data were gathered via self-structured, validated instruments capturing socio-demographics, knowledge, perceived roles, and training needs. An evidence-based HPV awareness pamphlet was distributed immediately following baseline assessments.

Results: The cohort was predominantly female (90.9%) and lacked prior exposure to school health programs (96.4%) or HPV training (100.0%). Severe health literacy deficits were observed, with 77.3% of teachers demonstrating poor baseline knowledge. Institutional disconnect was high; 63.6% exhibited poor commitment regarding active responsibilities in vaccine promotion. Conversely, 81.8% indicated high training demands, with an exceptional overall scale mean of 4.68 out of 5.0. Notably, the highest demand ($\mu=4.80$) was for structured educational materials (like pamphlets) to distribute during parent-teacher meetings.

Conclusions: While educators possess critically low baseline clinical awareness and professional involvement regarding HPV, they demonstrate immense, proactive motivation for capacity building. Distributing targeted, evidence-based awareness pamphlets represents an affordable, highly scalable intervention to bridge institutional gaps, empower educators, and foster supportive school environments for adolescent immunization.

Keywords: Human papillomavirus, HPV vaccination, Health literacy, School teachers

INTRODUCTION

Cervical cancer remains one of the most prominent public health challenges globally, functioning as a leading cause

of oncological morbidity and mortality among women, particularly within low- and middle-income countries (LMICs).¹ Virtually all cases of cervical cancer are etiologically linked to persistent infection with high-risk

strains of the human papillomavirus (HPV).¹ On a global scale, India bears a disproportionately high burden of this disease, accounting for more than 22% of total cervical cancer deaths worldwide.² Projections indicate that the overall incidence of cancer cases within the country will experience an upward trajectory, driven by systemic factors such as low screening coverage and limited vaccine penetration.³⁻⁵

Primary prevention through timely HPV vaccination targeted at young adolescents represents the most effective strategy to eliminate cervical cancer as a public health issue. While the World Health Organization (WHO) advocates for robust national immunization rollouts, the actual uptake of the HPV vaccine in India continues to encounter substantial public hesitancy, socio-cultural stigmas, economic barriers, and widespread misinformation regarding vaccine safety.^{2,6} To overcome these roadblocks and successfully implement school-based or community-based immunization drives, targeted public health education and outreach are essential tools to optimize vaccine acceptance and awareness.⁶

Within the school ecosystem, school teachers serve as critical, trusted stakeholders and prominent community influencers. Their perceptions, endorsement, and communication can directly impact parental consent and mitigate hesitancy surrounding adolescent vaccinations. However, global systematic evidence indicates that primary and secondary educators frequently lack explicit knowledge regarding the etiology of HPV, its transmission, and the preventative efficacy of the vaccine.⁷ For teachers to successfully function as health advocates, institutional programs must first identify their internal educational deficits and fulfil their specific instructional demands.

Despite the obvious importance of this demographic, there remains a paucity of structured institutional interventions within the Indian educational framework focused on transforming teachers into proactive health liaisons. To address this gap, the present study was undertaken. The primary objective of this research is to comprehensively evaluate the baseline health literacy, perceived duties, and specific training gaps of school teachers regarding HPV prevention. Moving beyond basic descriptive assessment, this study actively introduces a practical public health intervention through the engineering and distribution of a targeted, evidence-based awareness pamphlet.

METHODS

Study design and setting

A descriptive cross-sectional research design using a quantitative approach was employed to assess the existing level of knowledge, perceived responsibilities, and training requirements of school teachers at a single point in time without introducing an intervention before assessment. The study was conducted at Shri Guru Ram

Rai (SGRR) PUBLIC SCHOOL, Government Primary School, Charan Haly Child School, Floridale School, Government Girls Inter College (GGIC), Prabhanand Children Academy, Government Inter College, and Shivalik Hills Academy in Dehradun, Uttarakhand, India, during the four-month period from January to June 2026.

Participant selection and sample

The target population originally comprised school teachers and school nurses working in educational institutions. However, preliminary mapping revealed that dedicated school nurses were entirely unavailable in the selected schools; hence, the accessible population consisted exclusively of school teachers. A total of 110 school teachers who met the inclusion criteria were selected using a non-probability convenience sampling technique based on operational availability during the data collection period. Teachers who voluntarily consented to participate and were present during school hours were included, while those absent or unwilling were excluded.

Research instruments

Data were gathered via a self-structured instrument developed following an extensive review of WHO recommendations, national HPV vaccination guidelines, and literature. The instrument was split into four thematic sections.

Tool I: socio-demographic proforma

Captured baseline profiles including age, gender, educational qualification, school type, area, and prior health program exposure.

Tool II: structured knowledge questionnaire

Comprised 20 objective multiple-choice items mapping HPV transmission, oncogenic sequelae, vaccination schedules, and school-based health protocols.

Tool III: roles and responsibilities scale

A 10-item behavioral Likert scale assessing teachers' perceived institutional duties toward vaccine promotion.

Tool IV: training needs assessment scale

A 15-item 5-point Likert scale (5=strongly agree, 1=strongly disagree) evaluating specific clinical, pedagogical, and psychosocial instructional demands.

Validity and reliability

Content validity was established through formal panel reviews by specialists in nursing, pediatric oncology, public health, and health education. Reliability was established via a pilot study among 10 school teachers (excluded from the final analysis). Internal consistency

calculated via Cronbach's alpha yielded a coefficient of approximately 0.80, indicating a highly reliable instrument.

Data collection and ethical considerations

Institutional and administrative clearances were procured from school managements prior to enrolment. Written informed consent was obtained from each participant, ensuring voluntary involvement, confidentiality, and data anonymity through alphanumeric coding. Data collection was executed during pre-scheduled school hours. Immediately following the collection of baseline questionnaires, the investigator implemented the study's public health intervention: distributing an evidence-based HPV awareness pamphlet containing clinical guidelines, safety data, and communication strategies to all 110 participants.

RESULTS

Socio-demographic characteristics of the cohort

The socio-demographic distribution of the participating educators (N=110) is synthesized in Table 1. Notably, the cohort was overwhelmingly female (90.9%) and predominantly operating within private institutional structures (63.6%). Structural exposure to formal health initiatives was remarkably low: 96.4% reported zero prior involvement in school health programs, and 100.0% lacked prior formal training regarding HPV vaccination.

Quantitative evaluation of baseline knowledge

Evaluating the knowledge metrics via tool II demonstrated severe health literacy deficits across the cohort. A

substantial majority (77.3%) scored within the poor knowledge range (0-10 marks out of 20). Only 18.2% achieved moderate awareness, and an extremely marginal subset (4.5%) demonstrated good baseline knowledge regarding HPV preventative mechanics.

Appraisal of perceived roles and responsibilities

Behavioral analysis via Tool III confirmed an institutional disconnect: 63.6% of teachers scored in the poor category regarding their active responsibilities toward HPV immunization drives. 31.8% demonstrated moderate readiness, and a minor fraction (4.5%) exhibited proactive behavioural commitment.

To expose explicit behavioural patterns, the scale was broken down into three operational sub-domains (Table 2).

Educators reported high rates of complete non-involvement ("Never") in critical activities, notably in coordinating with local health centers (86.4%), tracking guidelines (86.4%), and communicating safety profiles with parents (81.8%).

Structured training needs assessment

In stark contrast to their poor baseline literacy, teachers displayed an immense, positive desire for capacity building. An overwhelming majority (81.8%) fell within the high training need stratification (51-75 score range), with the remaining 18.2% indicating moderate demand. Notably, zero participants (0.0%) selected a low training need profile.

The domain-wise breakdown yielded an exceptionally high overall scale mean score of 4.68 out of 5.0 (Table 3).

Table 1: Socio-demographic variables of the cohort (n=110).

Variable	Category	Frequency (f)	Percentage (%)
Gender	Male	010	009.1
	Female	100	090.9
Designation	School teacher	110	100.0
Type of school	Government	040	036.4
	Private	070	063.6
Area of school	Urban	058	052.7
	Rural	032	029.1
	Semi-urban	020	018.2
Qualification	Undergraduate (UG)	065	059.1
	Postgraduate (PG)	045	040.9
	Doctorate	000	000.0
Experience in health programs	Yes	004	003.6
	No	106	096.4
Previous HPV training	Yes	000	000.0
	No	110	100.0

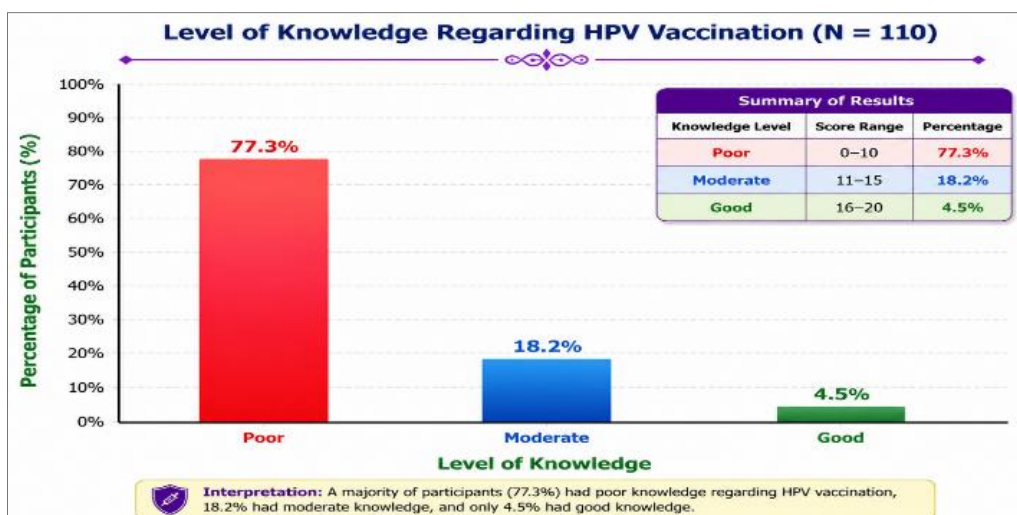


Figure 1: Level of knowledge regarding HPV vaccination (n=110).

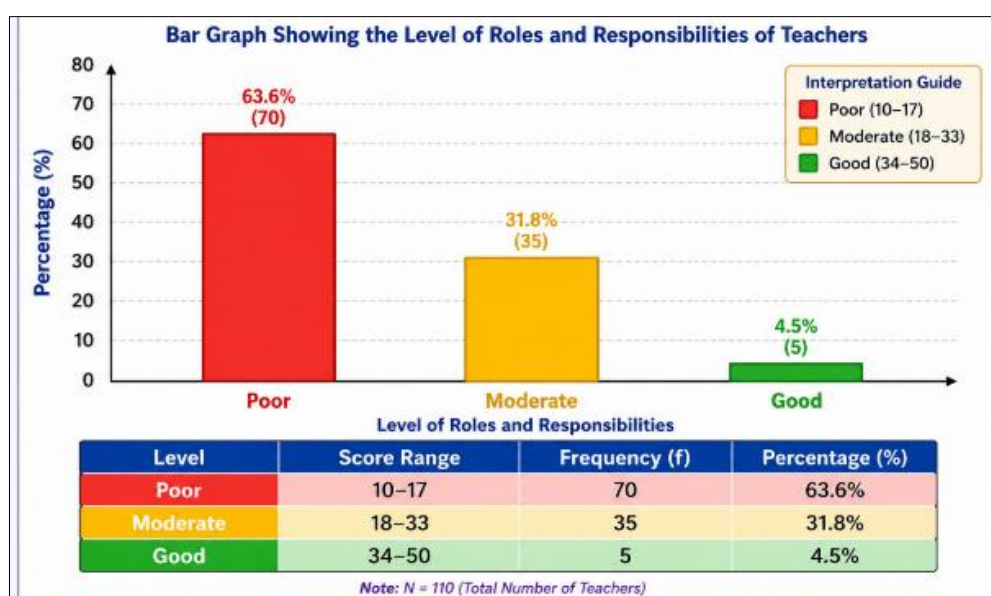


Figure 2: Level of roles and responsibilities of teachers (n=110).

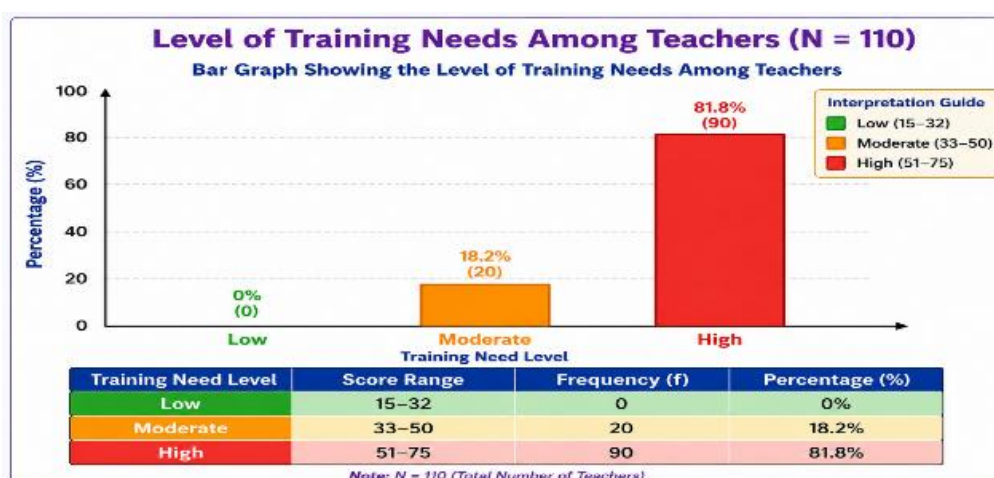


Figure 3: Level of training needs among teachers (n=110).

Table 2: Sub-scale domain analysis of perceived teacher roles (n=110).

Domain and item	Behavioural responsibility statement	Always, f (%)	Often, f (%)	Sometimes, f (%)	Rarely, f (%)	Never, f (%)	Item mean (μ)
Domain A	Health education and advocacy						
Item 1	Educate students about importance of HPV vaccine	00 (0)	03 (2.7)	12 (10.9)	35 (31.8)	60 (54.5)	1.61
Item 2	Provide details on HPV infection and prevention	00 (0)	01 (0.9)	08 (7.3)	41 (37.3)	60 (54.5)	1.54
Item 7	Participate in HPV health education sessions	01 (0.9)	04 (3.6)	18 (16.4)	32 (29.1)	55 (50.0)	1.76
Domain B	Program logistics and institutional coordination						
Item 3	Assist in organizing school vaccination camps	02 (1.8)	05 (4.5)	15 (13.6)	28 (25.5)	60 (54.5)	1.73
Item 4	Maintain records of vaccinated students	00 (0)	02 (1.8)	10 (9.1)	18 (16.4)	80 (72.7)	1.31
Item 6	Coordinate with local public health centers	00 (0)	01 (0.9)	04 (3.6)	10 (9.1)	95 (86.4)	1.19
Domain C	Psychosocial counseling and outreach						
Item 5	Communicate with parents about vaccine safety	00 (0)	00 (0)	05 (4.5)	15 (13.6)	90 (81.8)	1.22
Item 8	Counsel anxious students before inoculation	02 (1.8)	06 (5.5)	20 (18.2)	32 (29.1)	50 (45.5)	1.90
Item 9	Keep updated with national HPV guidelines	00 (0)	00 (0)	03 (2.7)	12 (10.9)	95 (86.4)	1.16
Item 10	Promote equal vaccine participation of boys/girls	01 (0.9)	02 (1.8)	15 (13.6)	22 (20.0)	70 (63.6)	1.46

Table 3: Item-wise distribution and means of tool IV by operational sub-domains (n=110).

Domain and item	Perceived training need statement	Strongly agree, f (%)	Agree, f (%)	Neutral, f (%)	Disagree, f (%)	Strongly disagree, f (%)	Item mean (μ)
Domain A	Clinical literacy and pathological awareness						
Item 1	Need training on clinical links of HPV and cancer	88 (80.0)	18 (16.4)	04 (3.6)	00 (0)	0 (0)	04.76
Item 2	Require instruction on dosage and timing schedules	82 (74.5)	22 (20.0)	06 (5.5)	00 (0)	00 (0)	04.69
Item 3	Training needed on safety and common side effects	85 (77.3)	20 (18.2)	05 (4.5)	00 (0)	00 (0)	04.72
Item 14	Regular updates on guidelines should be provided	80 (72.7)	24 (21.8)	06 (5.5)	00 (0)	00 (0)	04.67
Domain B	Pedagogical integration and resource demands						
Item 8	Want to learn to integrate oncology into regular classes	72 (65.5)	28 (25.5)	10 (9.1)	00 (0)	00 (0)	04.56
Item 9	Need structured resources (pamphlets) for PTMs	92 (83.6)	15 (13.6)	03 (2.7)	00 (0)	00 (0)	04.80
Item 10	Training would raise confidence to counsel genders	86 (78.2)	20 (18.2)	04 (3.6)	00 (0)	00 (0)	04.74
Item 11	Prefer interactive workshops over long policy manuals	75 (68.2)	25 (22.7)	10 (9.1)	00 (0)	00 (0)	04.59
Domain C	Psychosocial counseling and barrier management						
Item 4	Feel unequipped to handle complex parental questions	90 (81.8)	16 (14.5)	04 (3.6)	00 (0)	00 (0)	04.78
Item 5	Need strategies to manage adolescent needle anxiety	78 (70.9)	26 (23.6)	06 (5.5)	00 (0)	00 (0)	04.65
Item 6	Workshops needed to track records and consent forms	70 (63.6)	32 (29.1)	08 (7.3)	00 (0)	00 (0)	04.56

Continued.

Domain and item	Perceived training need statement	Strongly agree, f (%)	Agree, f (%)	Neutral, f (%)	Disagree, f (%)	Strongly disagree, f (%)	Item mean (μ)
Item 7	Require guidance to coordinate effectively with PHCs	68 (61.8)	34 (30.9)	08 (7.3)	00 (0)	00 (0)	04.54
Item 12	Professional sessions needed to debunk vaccine myths	84 (76.4)	21 (19.1)	05 (4.5)	00 (0)	00 (0)	04.71
Item 13	Training needed to handle strong parental refusal	89 (80.9)	17 (15.5)	04 (3.6)	00 (0)	00 (0)	04.77
Item 15	Highly motivated to join health programs if organized	85 (77.3)	20 (18.2)	05 (4.5)	00 (0)	00 (0)	04.72

The highest mean score across the entire instrument was identified in item 9 ($\mu=4.80$), where 83.6% strongly agreed that they need structured educational materials (like pamphlets) to distribute during parent-teacher meetings (PTMs). This provided direct empirical validation for this study's primary intervention: the engineering and instant dissemination of the custom awareness pamphlet.

DISCUSSION

Preventing cervical cancer through timely adolescent immunization is an urgent public health priority for India, which shoulders more than one-fifth of global cervical cancer mortality.^{1,2} School teachers represent critical frontline stakeholders who can bridge the gap between complex health systems and parental consent.⁷ However, the empirical findings of this study reveal a stark disparity between teachers' high willingness to participate and their critically low baseline clinical awareness and professional involvement.

Socio-demographic vulnerabilities and the school ecosystem

A defining characteristic of this cohort (N=110) is its predominantly female composition (90.9%). Within the socio-cultural architecture of Northern India, female educators are uniquely positioned to spearhead reproductive health initiatives, frequently serving as direct confidantes for adolescent girls navigating pubertal hygiene and preventive care. Yet, a striking 96.4% of participants reported absolutely no prior experience in school health programs, and 100.0% had never received formal instruction regarding HPV vaccines. This structural void mirrors findings by Senthilkumar, who highlighted that school health initiatives in India remain sporadic, underfunded, and isolated from the active teaching workforce.²

The knowledge deficit: a barrier to vaccine acceptance

Our objective evaluation revealed that 77.3% of educators possessed poor baseline knowledge concerning HPV pathology, transmission dynamics, and dosing schedules. Such generalized health illiteracy poses an acute public health risk. Vaccine hesitancy across Indian communities

is deeply driven by groundless socio-cultural stigmas, safety anxieties, and a lack of clear information regarding non-coital transmission pathways.⁶ When teachers are unaware of basic facts—such as the optimal target age range for inoculation (9-14 years) or the primary preventative nature of the vaccine against cervical malignancy—they cannot effectively counter localized myths or reassure anxious parents. This aligns closely with Choi et al, whose systematic review concluded that educators across various developing regions routinely exhibit low health literacy regarding safety profiles, severely limiting their support for institutional vaccination drives.⁷

Redefining the role of educators: actionable opportunities

The behavioral gap identified (63.6% poor perceived roles) suggests that teachers largely view immunization campaigns as strictly medical tasks belonging exclusively to visiting medical officers or public health workers. This institutional detachment prevents schools from developing into proactive health-promoting environments. As established by Krokidi et al, school-based vaccination campaigns achieve maximum coverage when teachers lay the groundwork by conducting preparatory parent-teacher association meetings and distributing accurate educational literature.⁶

The most encouraging and actionable insight from this study is that 81.8% of the participants expressed a high training need, with not a single educator reporting a low need for training. This uniform demand demonstrates that the prevailing deficit is not caused by institutional apathy. Instead, teachers are highly motivated and explicitly recognize their professional limitations regarding preventive oncology.

To immediately address this need, this study introduced a practical public health intervention: the development and dissemination of an evidence-based HPV awareness pamphlet. This tailored educational tool was distributed to all 110 participants immediately after data collection. By compiling clear details on viral transmission, vaccine schedules, safety records, and practical ways to manage parental queries, this pamphlet serves as an affordable, reproducible, and highly scalable intervention. It fulfills the exact resource gap highlighted in item 9 ($\mu=4.80$) and

provides a structured framework for future large-scale school health education programs.

Limitations

This study has several noteworthy limitations. First, the use of a non-probability convenience sampling technique restricted to selected schools in Dehradun limits the generalizability of the findings to rural, broader state, or national populations.

Second, the reliance on self-reported questionnaires for evaluating perceived roles and training needs introduces potential response bias or social desirability bias.

Finally, as a cross-sectional study, this design evaluates literacy and perceptions at a single time point without measuring long-term knowledge retention or tracking actual changes in vaccine uptake following the pamphlet distribution.

CONCLUSION

This study demonstrates that school teachers in Dehradun, Uttarakhand, currently possess inadequate knowledge and low professional involvement regarding HPV vaccination frameworks. This vulnerability is heavily driven by a complete lack of prior formal training and historical isolation from school health programs. Encouragingly, teachers exhibit a strong willingness and high demand for structured professional capacity building. Introducing simple, evidence-based educational interventions-such as the custom-designed awareness pamphlet developed in this study-is a highly effective strategy to bridge these operational gaps. Empowering teachers with accurate clinical awareness is a crucial step toward building a supportive, pro-vaccine school ecosystem capable of accelerating cervical cancer elimination efforts across India.

Recommendations

For health policy and institutional practice

Mandatory orientation programs

The ministry of health and family welfare (MoHFW), in collaboration with the department of school education, should integrate brief, structured orientation modules on adolescent vaccines (such as HPV and Tdap) into regular teacher training frameworks.

Institutionalization of the awareness pamphlet

The evidence-based awareness pamphlet developed in this study should be adapted into regional languages (e.g., Hindi) and officially distributed across all government and private schools in Uttarakhand during parent-teacher meetings.

Establishment of school health committees

Schools should form dedicated health promotion committees, led by senior teachers, to coordinate directly with local public health centers (PHCs) before and during active immunization drives.

For future research

Evaluative quasi-experimental studies

Future researchers should conduct longitudinal, multi-center, quasi-experimental studies (pre-test/post-test designs) to mathematically measure the direct impact of the awareness pamphlet on teachers' knowledge retention and actual vaccine uptake rates.

Large-scale multi-centric inquiries

A broader study spanning multiple districts across both rural and urban strata of Uttarakhand would yield more generalizable insights into regional variations in teacher perceptions.

Qualitative triangulation

Combining quantitative assessments with focus group discussions (FGDs) would provide deeper insight into the specific cultural taboos and socio-religious factors influencing teachers' views on reproductive health education.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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