IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 5, March 2024

A Review of Using Systematic Search Methodology to Examine the Effects of Health Education Interventions on HPV Vaccination Uptake, Awareness, and Acceptance among Individuals Under 30 Years of Age in India

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Abstract: *Despite being a key preventive measure against HPV-related malignancies worldwide, the HPV vaccination is not included in the national immunisation programme in India. We investigate the efficacy of health education about uptake, acceptance, and awareness in the context of the introduction of the indigenous vaccination.*
Methods: The following databases were used for research: PubMed, CINAHL, Scopus, and Embase. Studies that involved individuals between the ages of 9 and 29 and were carried out in India with primary data collection and health education interventions were considered. Results: Seven studies were included from a total of 10.952 results. Three studies concentrated on university students between the ages of 17 and 26 and four on teenage girls between the ages of 9 and 20. Two studies were conducted in rural regions and five in metropolitan areas. Interventions in health education have been shown to be successful in raising HPV vaccine uptake, awareness, and acceptance. Among the obstacles were financial constraints, a lack of knowledge, and cultural differences.
Conclusion: The findings of this study suggest that policymakers take prompt action to inform and motivate the youth population to get vaccinated against HPV. Future initiatives ought to target various demographic groups and be tailored to their unique requirements and characteristics. Males and underprivileged groups need to be given special consideration. It was advantageous to have a variety of stakeholders involved, and it is strongly advised.

Keywords: HPV— cervical cancer, human papillomavirus, health education, vaccines, adolecent girls

I. INTRODUCTION

The majority of people who are sexually active are thought to have contracted the Human Papillomavirus (HPV), the most prevalent sexually transmitted infection (STI) of the reproductive system, at some point in their lives (1, 2). Thirteen of the more than 150 viral genotypes that make up the HPV family have been found to be carcinogenic or high risk. In addition to lifestyle factors, persistent infections are linked to a significant percentage of oropharyngeal, penile, vaginal, and vulvar cancers, as well as over 90% of cervical and anal cancers. Remarkably, 90% of the new infections resolve without causing long-term problems. It has been demonstrated that the incidence of HPV-related cancer cases can be significantly decreased by implementing prophylactic immunisation against the carcinogenic genotypes. Nevertheless, a number of barriers, including vaccination hesitancy and high cost, have hampered efforts to promote the preventative HPV vaccine globally, which calls for more research on the topic.

An estimated 60,000 instances of cancer in males and 570,000 cases in women worldwide are linked to HPV each year. most of them taking place in nations with low and moderate incomes. More specifically, women and men in Asia account for 275,429 and 29,324, respectively, of the nearly half of all HPV-related cancer cases worldwide. One-sixth of the world's population resides in India, where cervical cancer is the second most frequent cancer among women. Furthermore, it represents a significant risk to the health of women, accounting for around 25% of the worldwide burden of disease in terms of death and morbidity. Over time, women's health in India has encountered societal and cultural obstacles. The strong patriarchal nature of Indian society causes disparities in women's health. For instance, India's birth-to-sex ratio has historically been biassed in favour of men, which has resulted in a number of problems in particular regions of the nation. In India, there is still a shame and taboo around sexual intercourse, especially for young single women. The general

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stigma around women having sex carries over to STIs, such as HPV, which complicates detection even more. In addition to stigma, women in India frequently experience prejudice when requesting assistance with sexual and reproductive health rights (SRHR) issues, including from healthcare professionals.

In India, numerous initiatives have been made to combat cervical cancer. The Indian government initiated the First National Cancer Control Programme in 1975 with the goal of offering women undergoing advanced cancer institutions cytology-based examinations. The initiative was incorporated into the National Programme for Prevention and Control of Diabetes, Stroke, Cardiovascular Diseases, and Cancer (NPCDCS) in 2010. This programme focused on common lifestyle factors like food, alcohol usage, and smoking in an effort to control non-communicable diseases. The Indian Ministry of National and Family Welfare (MoNFW) launched a mobile technology platform for cervical cancer screening in 2016 in order to support and oversee the screening initiatives in each state. Visual inspection techniques, such as visual inspection with acetic acid (VIA), are the recommended screening approach above HPV-DNA testing and the Papanicolaou smear test (Pap-test). The affordability of VIA, the promptness of the results, and the challenges associated with preserving Pap and HPV-DNA test samples all support its choice. But VIA is not very sensitive, especially in the early stages of cervical cancer; PAP and HPV-DNA tests, on the other hand, have been shown to be more sensitive in early stage diagnosis, which leads to improved patient outcomes. Apart from the government's extensive efforts, screening coverage in India is still low, and the country still largely fails to meet the demand for universal screening for cervical cancer. The majority of cervical cancer patients are discovered at an advanced stage with low survival chances, reflecting the inefficiencies of the current system.

Nonetheless, new avenues for early prevention have been made possible by the development of HPV vaccinations. By giving the HPV vaccine, over 80% of malignancies brought on by HPV can be avoided. The World Health Organisation (WHO) and United Nations Children's Fund (UNICEF) want to see 90% of teenage girls worldwide vaccinated against HPV by 2030 as part of the Cervical Cancer Elimination Strategy. This aim (target 3.b: critical medicines and vaccines) is in line with the agenda of the Sustainable Development Goals (SDGs). 2008 saw the licencing of two HPV vaccinations in India: the bivalent CervarixTM and the quadrivalent Gardasil TM. The virus-like particles (VLPs) included in both vaccinations are created by HPV surface components. Antibodies will cover the virus in the event of infection, stopping it from releasing its genetic material. Both vaccinations offer excellent protection against malignancies linked to HPV. Specifically, they offer about 90% protection against cervical cancer, and the antibodies have a minimum 10-year stability period. In India, HPV vaccinations are still only accessible through private prescription starting at age nine and are not included in the National Immunisation programme. The high expense of HPV vaccination (about INR 3,000 per dose), false information about its efficacy and safety, and negative cultural attitudes towards vaccinations all contribute to India's low vaccination uptake. Low vaccination uptake has been seen, especially in the wake of ethical concerns over HPV vaccine delivery practices.

However, the state of the HPV vaccination's acceptance and accessibility in India is encouraging. Several states have effectively established cost-effective HPV vaccination programmes since 2016, resulting in high coverage. The Serum Institute of India created an indigenous quadrivalent vaccination, which was authorised by the Drugs Controller General of India (DCGI) in July 2022. Additional information was released on September 1st, 2022. For both males and girls, the new quadrivalent vaccine is expected to cost between INR 200 and 400 per dosage, indicating both affordability and good coverage among the youth population. Recent reports indicate that in July 2023, the Indian government plans to launch HPV vaccination campaigns in six states. Nevertheless, no official notification is available at this time.

The difficulties resulting from misinformation that surfaced during the initial deployment of a vaccination programme suggest that health education plays a crucial role in the effective execution of the HPV vaccination strategy. Numerous studies have shown that health education improves health literacy, particularly in youth, and encourages the adoption of healthy behaviours in a range of contexts. Age-appropriate education aids in young people's understanding of the significance and applicability of HPV vaccination, and health education strategies have been effectively used to raise awareness and adoption of the vaccine throughout the world. Nonetheless, there are concerns limiting its efficacy due to the conservative views of Indian society towards health education, particularly on subjects pertaining to SRHRs and especially among Indian youth.

There is currently a wealth of evidence from questionnaire-based studies evaluating young people in India's understanding and acceptability of the HPV vaccine. Nevertheless, the current body of research focuses only on gathering data about

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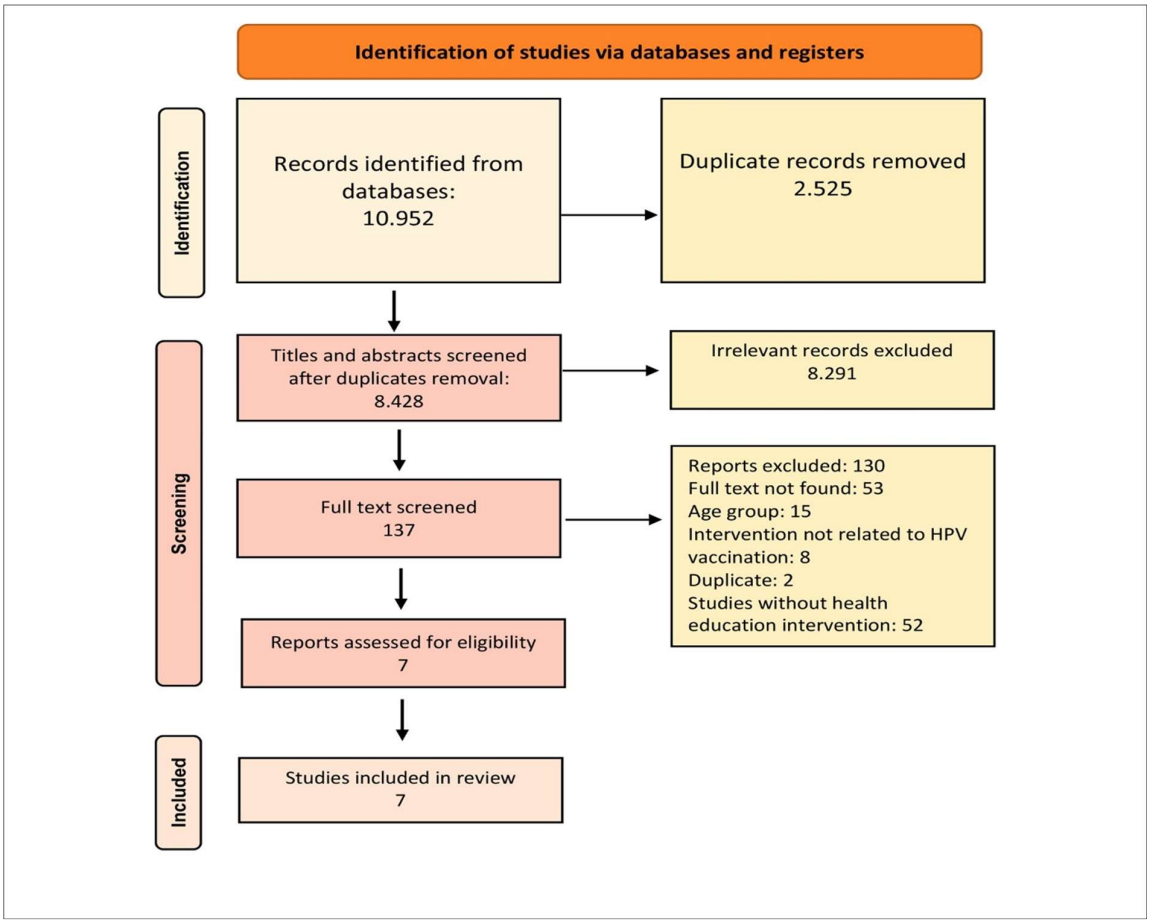
these industries without making any attempts to enhance them. Furthermore, a significant knowledge vacuum exists regarding the impact of health education on vaccination uptake, knowledge, acceptance, and willingness due to the lack of comprehensive reviews. Specifically, to improve HPV vaccination among young people in India, the most effective type of health education needs to be examined in light of the new, indigenous HPV vaccination. The objective of this systematic review is to investigate the impact of health education on the uptake, knowledge, acceptance, and readiness to get vaccinated against HPV among individuals under 30 years of age in India. Researchers, the Indian Ministries of Education and the MoNFW, and policymakers will find value in our findings.

II. METHODS

In this comprehensive analysis, we investigate the efficacy of health education starting at age nine, which is the cutoff point for HPV vaccination. Since 90% of Indians have their first sexual experience before the age of 30, 29 is our maximum limit. According to the most recent vaccination standards, the first dose need to be administered prior to the first sexual encounter. After doing a pilot study, we thoroughly searched PubMed, CINAHL, Embase, and Scopus. The scope of the investigation went beyond abstracts and titles. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 standards were followed by the research protocol. Qualifications for inclusion Research using mixed, qualitative, and quantitative methodologies



Results

The review procedure is summed up in the PRISMA flowchart (Figure 1). 10.952 studies were evaluated in total; 407 of those were qualified for abstract screening, and 137 of those were eligible for full-text screening, following the elimination of duplicates and title screening. Seven studies made it into our review after the full-text screening; the

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exclusion criteria were: no health education intervention; age group ineligibility; unrelated intervention to HPV vaccination; geographic location; full text not found; and duplicate (Table 1).

Demographics

Our systematic analysis included seven eligible studies, the oldest of which had been reported, based on the inclusion and exclusion criteria (Table 1). Three studies concentrated on university students between the ages of 17 and 26 and four on teenage girls between the ages of 9 and 20. Two of these seven studies had subjects who were both male and female. Undergraduate healthcare students participated in both university-based investigations. Two of the investigations were conducted in rural regions, while the other two were conducted in universities located in Mangalore (Figure 2).

Types of health education and evaluation

Various health education interventions were described; however, analytical descriptions of the approaches were absent from some of the research. Workshops and audiovisual presentations made up the majority. The study conducted by Mandal et al. involved an orientation camp awareness session aimed at adolescent girls and their parents. It was found that the participation of local stakeholders was crucial in promoting the local community. Similar to this, the state of Sikkim used a community-based strategy, targeting various stakeholders, including teenage females, with a variety of health education materials like training, community-based workshops, and pamphlets. The use of audio-visual presentations lasting five to twenty minutes was reported in two studies conducted by Padmanabha et al. and Shetty et al. that targeted healthcare students in Mangalore. In a study by Ramavath & Olyai, the researchers gave health-related lectures to teenage girls in urban Indian schools and universities. A three-session sensitization programme was introduced by colleges in Bhubaneswar to educate teenage girls about HPV vaccine, cervical cancer prevention strategies, and the epidemiology of the disease. Finally, the health education approach employed in the Baria et al. study conducted in the Gujarati village of Waghodiya Taluka was described as a “health awareness program,” but no more information regarding the techniques is provided.

Uptake

Only three of the seven trials gave the participants the chance to get the HPV vaccine after the health education intervention. Adolescent girls in rural West Bengal and the state of Sikkim were found to have an uptake of above 95%. In a Bhubaneswar college research, 58.33% of the girls received their first dosage of the vaccine, despite the fact that 86% of them had consented to take it. It was noted that while a small fraction of participants (3,33%, 10%, and 21% of all participants) had previously had the vaccination, some had.

TABLE 1 Demographics.

Title	Experience of Human Papillomavirus Vaccination Project in a Community Set Up-An Indian Study	Acceptability of human papillomavirus vaccination among medical students in Mangalore, India	An exploratory study of undergraduate healthcare student perspectives regarding human papillomavirus and vaccine intent in India	Human papillomavirus (HPV) vaccine introduction in Sikkim state: Best practices from the first statewide multiple-age cohort HPV vaccine introduction in India-2018–2019	Preparedness of young girls for prevention of cervical cancer and strategy to introduce the HPV vaccine	Knowledge and awareness of HPV infection and vaccination among urban adolescents in India: A cross-sectional study	Effectiveness of Health Awareness Programme on Knowledge Regarding Cervical Cancer and Human Papilloma Vaccine among Adolescent Girls at Waghodia Taluka

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Year	2021	2019	2021	2022	2018	2013	2019
Authors	Mandal et al.	Padmanabha et al.	Shetty et al.	Ahmed et al.	Swain & Parida	Ramavath & Olyai	Baria et al.
Journal	Asian Pacific Journal of Cancer Prevention	Elsevier Vaccine	SAGE Women's Health	Elsevier Vaccine	Indian Journal of Community Medicine	The Journal of Obstetrics and Gynecology in India	International Journal of Nursing Education
Type of Study	Not mentioned	Not mentioned	Cross-sectional observational study	Multi-staged cohort study	Quasi-experimental pretest and posttest design	Cross-sectional	Pre-experimental one group pre-test- post-test design
Location	West Bengal (Rural)	Kasturba Medical College, Mangalore, Karnataka	K S Hegde Medical Academy (KSHEMA), Mangalore, Karnataka	Schools in Sikkim state	College at Bhubaneswar, Odisha	Ahmedabad (Gujarat), Cuttack (Odisha), Lucknow Gwalior and Visakhapatnam	Waghodiya taluka village, Gujarat
Sample group	Girls and parents	Medical students	Undergraduate students in the healthcare department	Age-eligible girls: 199 and other stakeholders	College students (girls)	Adolescent girls	Adolescent girls
Size	555 girls	263 participants	20 students (11 males/9 females)	279 participants	60 participants	1000 participants	80 participants
Age	Girls 9–14 years	20–22 years	18–26 years	Girls 9–13 years/Age of other participants: unknown	17–24 years	13–19 years	9–20 years

Awareness

Four research looked at participants' knowledge of HPV, cervical cancer, screening techniques, HPV vaccine, and signs of cervical cancer; two of those studies found that participants' knowledge was low. More over 50% of the participants in the study by Shetty et al., which included 20 healthcare students in Mangalore, were found to have enough knowledge; the bulk of these individuals were medical students. It was shown in the same study that male participants' knowledge of the HPV vaccine was comparatively lower than that of female ones. Before the intervention, teenage participants in the Baria et al. study in Waghodiya taluka village had moderate to poor understanding; after the intervention, there was a significant improvement in this area.

In a similar vein, every study that examined participants' knowledge following the intervention noted an increase in participant knowledge.

Acceptance and willingness

The acceptance and willingness to get vaccinated were investigated in four trials. Despite their seeming differences, acceptance and willingness were used in the included research in comparable ways. In a study involving medical students, every female participant—aside from those who had already received vaccinations—expressed a wish to be vaccinated. Even following the health education intervention, the male participants in the same study were apprehensive. The

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vaccination willingness ranged from roughly 60% to 86% in the other three investigations. There was only one study that looked at participants' immunisation outcomes.

Barriers

There were numerous factors contributing to the reluctance to get the HPV vaccination (Table 1). The percentage that was provided is the proportion of individuals who said that the aforementioned factors prevented them from getting the HPV vaccine.

III. DISCUSSION

In order to improve the uptake, awareness, and acceptance of HPV vaccination among individuals aged 9 to 29, this review methodically gathered reports from primary studies conducted in India. It also serves as an evidence base for future research studies and policy. The findings of our study demonstrate how well health education works to improve every area that has been looked at. Prior to interventions, low knowledge was said to be widespread, particularly among the general public. In three trials, 58.33% to over 95% of participants took advantage of the option to get vaccinated. In general, female participants showed more awareness and acceptance than male individuals. Numerous approaches to health education were identified. Our research also sheds light on the underlying causes of HPV vaccine hesitation, with lack of awareness and expense ranking high among them. Our findings concur with those of the 2019 Thulaseedharan et al. systematic review. While Thulaseedharan et al. concentrated on Indians' knowledge, attitudes, and acceptance of HPV/cervical cancer, screening, and HPV from 1993 to 2017, our study also considered the efficacy of health education initiatives.

Future opportunities

The Cervical Cancer Elimination objective of 90% immunisation of girls up to 15 years old by 2030 is made possible by the approval of the domestic HPV vaccine to go on sale in July. In addition, only 63.3% of Indians are fully vaccinated against SARS-CoV-2, despite the country being severely impacted by the COVID-19 pandemic. This suggests a larger issue with vaccination hesitancy. Consequently, it's imperative to boost vaccination rates for the Covid-19 and HPV vaccines. India has the ability to boost immunisation coverage by investing in healthcare as the government works to grow the nation's economy. One of the primary tactics aimed at the younger generation in these redoubled efforts should be health education. It is recommended that knowledgeable policymakers recommend the communication guidelines created by the WHO in order to construct effective health education and communication strategies. For instance, the 2016 publication of the "HPV vaccine communication guide" contains guidelines for effective communication, details on the vaccine's safety, and instructions on how to develop a plan specifically for each demographic group. These resources are a valuable resource for creating vaccination communication plans in India, a country with a diverse population.

In addition, authorities should take into account the best practices from immunisation programmes that have been successfully carried out in India and abroad. Our findings demonstrate the state of Sikkim's effective strategy, since over 95% of the target population received both doses. A number of factors contribute to the success, including the thorough execution plan and the participation of numerous stakeholders, including parents, physicians, and leaders in the political and religious spheres. Additionally, depending on the target population, this HPV vaccination introduction programme includes a range of alternative instructional materials. The programme featured an assessment approach that involved over 200 interviews with parents and stakeholders as well as community observations. In Punjab, where a second HPV cost-effectiveness analysis was carried out, comparable techniques were applied. The analysis's findings showed that the HPV vaccination was economical in this state by lowering the lifetime risk of cervical cancer by 64%. Furthermore, a crucial intervention within Reproductive, Maternal, New-born, Child, and Adolescent Health (RMNCH + A) is the function of adolescent-friendly clinics (AFCs). AFCs might include counselling, education, and HPV vaccinations in their list of SRH services.

TABLE 2 types of evaluation, health intervention and results.

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Authors	Mandal et al.	Padmanabha et al.	Shetty et al.	Ahmed et al.	Swain & Parida	Ramavath & Olyai	Baria et al.
Type of evaluation of the health intervention	NA	Questionnaire regarding the knowledge about HPV/HPV vaccine and if students were vaccinated and why followed by the information session. After the intervention a second questionnaire regarding the acceptance and the barriers	Group discussions	Interviews	Pre-intervention and post-intervention questionnaires	Pre-intervention and post-intervention questionnaires	Pre-intervention and post-intervention questionnaires
Results	555 girls received 1st dose and 544 girls received their 2nd dose	After the intervention, about 60% of the participants answered positively about receiving the HPV vaccine, 7% denied and 34% were not sure.	Willingness to get vaccinated was higher among females than males with cost and cultural concerns being the main barriers. All participants were positive to promote the HPV vaccine in	More than 95% of the target population received both doses after health education. No severe side effects were reported. Factors that led to the successful vaccination	Improvement in the knowledge of symptoms and prevention was identified after the intervention. 52 girls agreed to receive the vaccine however, only 35 of them were vaccinated.	Poor knowledge was reported among the participants with about 70% not being aware of cervical cancer and HPV as a cause of it. However, participants were willing to receive more knowledge and vaccination. The	Before the intervention participants had inadequate knowledge of HPV vaccination and cervical cancer with the health education intervention improving significantly their

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			community settings and making it affordable.	campaign included among others strong political commitment.		intervention significantly improved knowledge, awareness, and acceptance with 74.4% of the participants agreeing to receive the vaccine.	knowledge.

TABLE 3 Type of evaluation prior to health intervention.

Authors	Mandal et al.	Padmanabha et al.	Shetty et al.	Ahmed et al.	Swain & Parida	Ramavath & Olyai	Baria et al.
Type of evaluation prior to health intervention	Prevaccine questionnaires	Questionnaire	N/A	N/A	Pre-intervention questionnaires	Pre-intervention questionnaires	Pre-intervention questionnaires

Health education strategies in south Asia and the US

Our analysis revealed a dearth of studies on HPV vaccine health education carried out in nearby nations including Bangladesh, Nepal, and Sri Lanka, underscoring the necessity of international evidence-based initiatives in South Asia. Nonetheless, a wide range of tactics are used in wealthy nations. Thirty papers met the eligibility criteria for Rani et al.'s 2020 systematic review on public education interventions in the United States of America (USA). The United States of America, a wealthy nation of 756 million people, has a 50% teenage HPV vaccination rate. In this study, parents and early adolescents were the target audience for communication techniques given by professionals, which led to higher uptake. In the USA, a second systematic evaluation was conducted on treatments at the practice and community levels. Future programmes, such as physician counselling or reminder calls, should be introduced in communities, such as schools, or in healthcare settings, according to the authors' recommendations. Interactive presentations in schools in Greece improved kids' understanding and acceptance of the vaccine. On the other side, a web-based intervention proved successful during the COVID-19 epidemic in China, the most populous nation in the world with poor rates of HPV vaccination uptake. College females were the intended audience for this intervention, which consisted of ten minutes a day of web-based instruction on a range of subjects linked to HPV vaccine and cervical cancer. The approach proved effective since it raised knowledge and acceptability while being inexpensive, simple to implement, and useful, particularly during lockdowns when few people were present. It is advised that future programmes draw inspiration from the interventions described in this research, enlisting the help of multiple stakeholders and utilising a range of instructional strategies based on the target population (students, parents, etc.), the program's environment (community-based, for example), and its constraints (pandemic, for example).

Reflection on the study population

Given the results of our study, where kids comprise the majority of the demographic group, it is imperative that information about the HPV vaccine be included in the health education curriculum in schools. Furthermore, by hosting

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workshops, theme days, and other events, universities should incorporate opportunistic vaccination and health education into their curricula, as awareness among their student body appears to be lacking. However, students do not make up the majority of the population in India, according to demographic data. According to a 2013 National Commission on Protection of Child Rights (NCPCR) report, only over 40% of youth between the ages of 15 and 18 attended school. Only roughly 27% of young Indians (those between the ages of 18 and 23) were enrolled in higher education in 2017–18, according to three surveys we discovered among university students. Students showed more awareness in the healthcare studies. This is supported by their field of study, and it is not appropriate to extrapolate to the vast majority of Indians. Furthermore, our investigation identified only two studies that included male participants. Compared to female participants, men showed less awareness and acceptance. Furthermore, just two of the seven research that we discovered were conducted in rural regions, despite the fact that 70% of Indians live there. For those between the ages of 15 and 18, school attendance in rural areas (37%) is significantly lower than in urban areas (51%). According to our analysis, five of the seven studies did not give enough details regarding the health education strategies that were employed. There is a significant research deficit in the use of health education interventions as well as in the study of marginalised youth demographic groups (illiterate, rural inhabitants). The entire Indian population should have access to health education and youth interventions in order to attain high immunisation coverage in the country. In light of the unique target population's characteristics—such as age, sex, socioeconomic class, place of residence, cultural and religious background, educational attainment, and access to technology—different approaches and techniques should be employed. More study and teaching initiatives are thought to be required because both boys and girls will be eligible to receive the indigenous vaccination. Finally, future studies should go into more detail about transparency with regard to the instruments and procedures employed to improve visibility and repeatability.

Amelioration of existing strategies

The HPV vaccination programmes could be included into India's current screening programmes for the prevention of cervical cancer. Screening programmes are primarily dependent on opportunistic screening or after symptoms occur, notwithstanding the current criteria. The target audience for the present screening programmes is married, sexually active women between the ages of 30 and 65. However, the National Family Health Survey conducted in 2015–2016 found that the average age at which women had their first sexual experience was 19.1 years, and 2% of the participants who were single and between the ages of 15 and 24 reported having sex before to marriage. Only 22,3% of eligible women were checked for cervical cancer between 2015 and 2016, according to the same data, with literate women screening at a greater rate. Therefore, a considerable percentage of eligible women are excluded by the present screening programmes. It is clear from focusing on married women that unmarried, sexually active women are marginalised. According to Thulaseedharan et al., there are major obstacles to cervical cancer screening that are similar to those found in our study on HPV vaccination (Tables 4, 5). However, there hasn't been much research done in this area, and existing anal cancer screening methods are insufficient. Only HIV-positive individuals are eligible for studies and screenings; most of these patients are male sex workers. Patients are frequently deterred from seeking assistance for their SRHR complaints due to the stigma associated with sexual orientation and sex work in India, which contributes to the ongoing burden.

Therefore, there is an urgent need for amelioration and a combination of current strategies in order to accomplish the targets of the cervical cancer elimination strategy, which include 70% screening and 90% HPV vaccination coverage by 2030. Future approaches should focus on raising awareness through health education tailored to the target community in order to address the hurdles associated with screening and immunisation. The age ranges for screening programmes ought to be expanded to include sexually active individuals of all sexes, marital statuses, and sexual orientations. It is recommended to expand the range and accessibility of presently available screening programmes to include screening for malignancies related to HPV, including anal cancers. Such an intervention might not be possible, though, as premarital sex, sexual orientation, and sex trade are still taboo in India. Both boys and females should receive the HPV vaccination, and awareness should be tailored based on sex and cultural norms.

ASHA workers could play a more significant role by offering HPV vaccination counselling in rural regions, where the rate of cancer is concerningly high due to a number of variables like illiteracy, poor hygiene, and early marriage (17). Respected women in rural communities who serve as the community's liaison with the public health system are employed by ASHA. ASHAs received accreditation as health mobilizers for cervical cancer screening in 2016 from the Rural Health

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Mission (RHM). However, despite ASHAs' strong awareness of cervical cancer, less than 10% of them underwent screening, according to studies conducted in the Varanasi district by Khanna et al. (61). Thus, it is imperative to implement strategies for closing the knowledge gap before expanding the function of ASHAs. Health education is crucial in this situation for two reasons: it informs ASHA employees about HPV vaccinations and screenings and assists them in enhancing their health promotion tactics. It is clear that assisting ASHA employees and expanding their responsibilities could result in improved screening and immunisation rates.

In conclusion, there is a need to raise the immunisation rates among girls who do not go to school. Research on creating a pro-equity HPV vaccination delivery programme for school-dropped girls in an Indian village was published in 2021 by Holroyd et al. Their findings emphasise the significance of parents' education and involvement, as well as the necessity of accessibility outside of schools. Vaccinated females should be included, media should be used to raise awareness among low-literate communities, and vaccination programmes should be tailored to the needs of the target populations. These are just a few of their proposals. The findings of this kind of research should be taken into account by policymakers when creating health education programmes for rural Indian minority groups.

TABLE 4 HPV vaccination barries.

Barriers	Percentage of participants	Number of studies	Analytical studies
Cost of the vaccine	56.7%–100%	4	Padmanabha et al, 2019: 63% Shetty, 2021:100% Swain and Parida, 2018:81.3% Ramavath & Olyai, 2013:56.7%
Safety of the vaccine	10%–15.6%	2	Padmanabha et al, 2019: 10% Ramavath & Olyai, 2013:15.6%
Lack of awareness	10%–24.8%	3	Padmanabha et al, 2019: 10% Swain & Parida,2018: 15,51% Ramavath & Olyai, 2013:24.8%
Not perceiving themselves in danger/ Not being sexually active	10%–81.3%	2	Padmanabha et al, 2019: 10% Swain & Parida,2018: 81.3%
Side effects	8%–15.6%	2	Padmanabha et al, 2019: 8% Ramavath & Olyai, 2013:15.6%
Cultural issues	55%	1	Shetty, 2021: 55%
Unwillingness of parents	22.41%	1	Swain & Parida, 2018: 22.41%
Fear of pain/needles	2.9%–17.24%	2	Swain & Parida, 2018: 17.24% Ramavath &Olyai, 2013: 2.9%

TABLE 5 HPV vaccination and screening barriers.

HPV vaccination barriers (current research)	Cervical cancer screening barriers (Thulaseedharan et al. 2019)
Cost of the vaccine	Lack of awareness (e.g. of cervical cancer screening procedure)
Safety of the vaccine	Lack of resources (e.g. time, money)
Lack of awareness	Provider-related barriers (e.g. discomfort with the pelvic examination by male providers)
Not perceiving themselves in danger/Not being sexually active	Not perceiving themselves in need (e.g. too old/too young)
Side effects	
Cultural issues	

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International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 5, March 2024

Unwillingness of parents	Psychosocial (e.g. not approved by husband/relatives)
Fear of pain/needles	

Limitations

Our study's primary restriction stems from the wide range of literature it included, which included research using mixed methodologies, qualitative, and quantitative approaches. Because of the substantial heterogeneity of the included studies and the lack of consistent measurements of outcomes, there was consequently no room for doing a meta-analysis on the available data. Furthermore, the current paper's findings may not be sufficient to determine the actual impact of health education on HPV uptake in India because there aren't enough studies utilising experimental and randomised control trials. These research approaches might have aided in determining the actual impact of the intervention. Moreover, the findings of this study might be applied to the entire country of India. In actuality, the samples are not typical, and the number of included studies is still quite limited. Finally, it is important to take into account the dearth of official data and surveillance from government sources (such as the uptake of the HPV vaccine) as well as the lack of prior research in this field.

IV. CONCLUSION

Taking into account the domestic HPV vaccination, India can successfully accomplish the 90% coverage objective for cervical cancer among girls under the age of 15. With the release of the domestic vaccination, the financial obstacle has been removed. It is necessary to take into account the additional impediments that our research has shown, like ignorance and cultural barriers. Our study showed that health education is a useful instrument for raising young Indian people's knowledge, acceptance, and uptake. Well-planned educational initiatives, like the one in Sikkim, may result in an uptake of over 95%. Our study's findings showed a research vacuum concerning males and marginalised populations, including persons living in rural areas and school-dropping females. Therefore, it is imperative that all Indian citizens have access to and inclusion in future health education initiatives. The unique traits of each target group should be considered by policymakers, and communication strategies should be modified accordingly. The effectiveness of HPV vaccination programmes has been shown to be significantly influenced by the participation of multiple stakeholders, including political and religious leaders. Therefore, it is advised that future programmes incorporate a range of stakeholders into their communication plan.

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IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 5, March 2024

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