

Original Research Article

KNOWLEDGE, ATTITUDES AND VACCINATION PRACTICES REGARDING HPV, HEPATITIS B AND INFLUENZA AMONG FIRST-YEAR MEDICAL STUDENTS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: The first year of medical education offers an opportunity to assess baseline vaccine knowledge and identify immunisation needs before routine clinical training. Positive views about vaccination do not necessarily translate into personal vaccine uptake. **Objectives:** To assess knowledge, attitudes and self-reported uptake of human papillomavirus (HPV), hepatitis B virus (HBV) and seasonal influenza vaccines among first-year medical students.

Materials and Methods: An institution-based analytical cross-sectional survey was conducted among first-year MBBS students at a private medical college in Eluru, Andhra Pradesh, India. The overall study period was October 2025 to April 2026; questionnaire collection occurred during October–December 2025. Of 250 eligible students, 205 participated (82.0%). Descriptive estimates, Wilson 95% confidence intervals and exploratory chi-square comparisons from aggregate counts were used.

Results: The mean age was 19.40 ± 1.11 years; 78.5% were female. Good knowledge was reported for HPV in 59.0%, HBV in 65.4% and influenza in 62.4%. Although 96.1% viewed vaccination as useful and safe, self-reported completion was 33.2% for HBV and 20.0% for HPV; 18.0% reported seasonal influenza vaccination. Neither sex nor residence showed statistically significant associations with vaccination status in analyses of available cross-tabulations.

Conclusions: The study revealed a substantial gap between vaccination awareness, positive attitudes and actual vaccine uptake among first-year MBBS students. Despite satisfactory knowledge, uptake remained low, particularly for HPV and influenza, with only one-third completing hepatitis B vaccination. These findings emphasise the need for structured vaccine education, routine assessment of vaccination status and accessible immunisation services early in medical training to improve vaccine coverage and promote preventive healthcare practices.

Keywords: Students, Medical; Health Knowledge, Attitudes, Practice; Vaccination; Hepatitis B Vaccines; Papillomavirus Vaccines; Influenza Vaccines.

INTRODUCTION

Vaccination is an essential component of disease prevention and is particularly relevant to students preparing for future clinical responsibilities. The first

year of medical education provides an opportunity to establish accurate vaccine knowledge, review personal vaccination records and plan indicated immunisations before routine patient-care exposure. These early practices may also support students'

future capacity to counsel patients on prevention. The present study examines three vaccines that differ in target population, schedule and programme delivery: human papillomavirus (HPV), hepatitis B virus (HBV) and seasonal influenza vaccines.

Persistent infection with oncogenic HPV types is a necessary cause of nearly all cervical cancers. Prophylactic HPV vaccination reduces the risk of infection with vaccine-covered types and is most effective when delivered before exposure. The World Health Organization (WHO) identifies HPV immunisation as a central pillar of cervical cancer elimination, while vaccine guidance has evolved to accommodate programme-specific schedules and catch-up opportunities.^[1] First-year medical students may already have formed beliefs about HPV, cervical cancer prevention, vaccine eligibility and safety before receiving formal undergraduate teaching on these subjects. Assessing their baseline understanding may help inform early preventive-health education and their future clinical counselling skills.

Hepatitis B remains a major public health and occupational concern. Exposure to infected blood and certain body fluids can occur in healthcare settings through sharps injuries and other contact incidents. The WHO Global Hepatitis Report 2024 highlights the continuing burden of viral hepatitis and the need to strengthen prevention, diagnosis and treatment services.^[2] Immunisation, together with standard precautions and appropriate post-exposure management, is an important safeguard for healthcare personnel. Although first-year medical students may not yet have routine clinical exposure, early review of HBV vaccination documentation and access to indicated doses can help prepare them for later clinical postings.

Seasonal influenza has a different epidemiological profile and requires periodic immunisation. Healthcare personnel can acquire influenza through community or patient contact and may contribute to transmission in care facilities. WHO influenza vaccine recommendations emphasise protecting groups at increased risk and the role of vaccination strategies within health systems.^[3] Among students entering medical education, seasonal vaccine uptake may be shaped by perceived susceptibility, familiarity with recommendations and ease of access. Campus campaigns, vaccine availability and academic schedules may influence whether preventive intentions are translated into immunisation.

Although HPV, HBV and influenza immunisation are distinct, they provide a useful lens for examining the knowledge–attitude–practice (KAP) divide. Knowledge concerns transmission, vaccine availability and effectiveness; attitudes reflect confidence and perceived value; practices include self-reported vaccine uptake. The WHO global health sector strategies place prevention and equitable access alongside reliable health information in the response to infectious diseases.^[4] Guidance for

immunising healthcare personnel also addresses students and trainees who may have patient-care exposure.^[5] In a first-year MBBS cohort, these measures should be interpreted as an early educational and preventive-health assessment, not as findings from practising healthcare workers or students with established routine clinical duties.

Previous work among European medical students and early graduates documented variation in vaccine-related attitudes, knowledge and self-reported coverage.^[6] Indian studies have likewise identified incomplete HBV immunisation among medical and nursing trainees, despite support for vaccination.^[7] Findings from practising healthcare workers further suggest that occupational knowledge does not always ensure completion of preventive measures.^[8] For HPV, student surveys report gaps in detailed knowledge and immunisation uptake even where attitudes are favourable.^[9,10] However, the three vaccines are commonly investigated separately using different instruments and student groups. Assessing them in the same first-year cohort offers a baseline institutional profile without implying that their indications or completion schedules are identical.

Accordingly, the present study assessed first-year medical students' knowledge about HPV, HBV and influenza vaccines, described their attitudes and self-reported vaccination practices, and explored associations of sex and place of residence with selected outcomes. The purpose was to identify opportunities for vaccine-specific education, record review and early access to immunisation services at the beginning of undergraduate medical training in Andhra Pradesh.

MATERIALS AND METHODS

Study design and setting: An institution-based analytical cross-sectional study was undertaken at a private medical college associated with a tertiary-care teaching hospital in Eluru, Andhra Pradesh, India. The overall study period was six months (15 October 2025 to 14 April 2026), with questionnaire-based data collection recorded from 15 October to 15 December 2025. Participants were first-year MBBS students; students from later years and employed healthcare personnel were not part of the study population.

Study population and sampling: The eligible first-year MBBS cohort comprised 250 students, of whom 205 (82.0%) voluntarily completed the online survey; 45 did not participate. Recruitment is therefore described as a voluntary-response sample from the defined academic cohort. Although systematic random sampling was referred to in an earlier study report, no sampling interval or random start could be verified; probability selection is not claimed. Each returned questionnaire represented one reported observation. No a priori sample-size calculation was documented.

Survey instrument and data collection: A structured, 68-item self-administered questionnaire was administered through Google Forms. It was described as pretested and adapted from published vaccination surveys.^[6,9,11,12] Available summary materials identified ten knowledge items for each of HPV, HBV and influenza, together with demographic, attitude and vaccine-uptake items. The complete original questionnaire, detailed pilot-test results, validation statistics and procedures for detecting duplicate or incomplete forms were not available for independent verification. No reliability coefficient or formally validated cut-off is therefore claimed.

Variables and operational definitions: Age was summarised in years and sex and place of residence as reported by respondents. Knowledge items were recorded as correct-answer percentages. For each antigen, a 0–10 score was available, with higher values indicating a greater number of correct answers. The source analysis dichotomised knowledge at the observed median (HPV ≥ 8 , HBV ≥ 9 and influenza ≥ 8), classifying scores at or above that cohort-specific cut-off as “good knowledge”. This is a relative analytical definition, not a validated competency or mastery threshold. Attitudes were measured using responses on perceived vaccination safety and usefulness, effectiveness of vaccination programmes, dominant information sources and willingness to recommend vaccination.

Vaccination practice was based on self-report: For HBV and HPV, responses were presented as “completed”, “awaiting next dose” or “no vaccination”; for influenza, receipt during the relevant winter was reported as yes/no. “Completed” was retained as recorded rather than reclassified against a particular age-specific schedule, because exact vaccine dates, dose numbers, product types and documentary verification were unavailable. The generic item asking about vaccination via the national programme was analysed separately; it should not be interpreted as proof of receipt of any of the three study vaccines. Screening for hepatitis was similarly a self-reported behaviour, without a specified test or time window.

Statistical Analysis: Counts and percentages were transcribed from the available study summary tables; means and standard deviations were retained as reported. For selected proportions, Wilson-score 95% confidence intervals were calculated from reported numerators and denominators. Pearson chi-square statistics were recalculated for the available aggregate sex- and residence-based contingency tables. Tests were two-sided and exploratory, with $p < 0.05$ used as a conventional threshold. Small expected cell counts limit the reliability of some asymptotic comparisons, particularly three-category HPV analyses. No adjustments for multiple testing or individual-level multivariable analyses were undertaken because the respondent-level dataset was not available for this reanalysis. The original study report cited Excel and SPSS version 31.

Ethical considerations. The study materials describe the questionnaire as anonymous and participation as voluntary. Institutional Ethics Committee review was reported at Alluri Sitarama Raju Academy of Medical Sciences, Eluru. The author-supplied reference number is ASRAMS/BHR/98232027; however, a shortened number (ASRAMS/BHR/982) appears in the most recent manuscript. Reporting was guided by the STROBE statement.^[13]

RESULTS

Participation and demographic profile. Of 250 eligible first-year MBBS students, 205 responded, giving a participation fraction of 82.0% (Wilson 95% CI 76.8–86.3%). Their mean age was 19.40 ± 1.11 years. Women comprised 161 participants (78.5%) and men 44 (21.5%); 127 (62.0%) reported urban residence and 78 (38.0%) rural residence. The available summary contains no age-specific outcome tabulations. [Table 1]

Knowledge of the three vaccine-preventable conditions. The study summary reported mean knowledge scores of 7.42 ± 1.86 for HPV, 8.60 ± 1.44 for HBV and 7.68 ± 1.73 for influenza (each on a 0–10 scale). Using the reported study-specific score thresholds, 121 (59.0%) were classified as having good HPV knowledge, 134 (65.4%) good HBV knowledge and 128 (62.4%) good influenza knowledge. These were cohort-specific thresholds rather than independently validated competency standards; comparisons of proficiency across vaccines should therefore be cautious. [Table 1]

For HPV, recognition that the infection can be sexually transmitted (88.3%) and that vaccination helps prevent cervical cancer (86.8%) was common; fewer participants knew that multiple HPV vaccines exist (66.3%) or recognised vaccine availability in India (72.7%). For HBV, correct recognition of blood-borne transmission was high (97.1%), as was awareness that casual handshakes do not transmit the infection (94.1%). Knowledge was comparatively lower regarding the availability of HBV treatment (52.2%) and its association with liver cancer (75.6%). For influenza, most understood its viral respiratory nature (90.7%) and droplet-related spread (88.8%); fewer correctly identified the annual vaccination requirement (72.7%) and the non-lifelong nature of vaccine-derived protection (69.8%). Item-level results are presented in Table 2.

Attitudes and information influences. A favourable general impression of vaccination was nearly universal: 197 respondents (96.1%; 95% CI 92.5–98.0%) endorsed vaccination as useful and safe, while 195 (95.1%) regarded immunisation programmes as effective tools of disease prevention. Scientific evidence was the most frequently selected principal influence (67.8%), followed by senior physicians or professors (22.0%), social media (7.8%) and relatives, friends or religious beliefs (2.4% when calculated from 5/205). Of the cohort,

181 (88.3%; 95% CI 83.2–92.0%) reported that they would advise others to be vaccinated. [Table 3]

Self-reported vaccination and screening practices.

Completion of the HBV schedule was reported by 68 participants (33.2%; 95% CI 27.1–39.9%); an additional 29 (14.1%) were awaiting another dose and 108 (52.7%) reported no vaccination in the recorded classification. HPV completion was reported by 41 (20.0%; 95% CI 15.1–26.0%), with 12 (5.9%) awaiting another dose and 152 (74.1%) reporting no vaccine. Only 37 (18.0%; 95% CI 13.4–23.9%) reported receiving seasonal influenza vaccine during the winter being assessed. A history of hepatitis screening was reported by 36 (17.6%). Although 172 (83.9%) reported vaccination via a national immunisation programme, the item did not establish receipt of HBV, HPV or influenza vaccine.

The contrast between favourable attitudes and lower uptake is based on separate aggregate measures and should not be interpreted as an individual-level association. [Table 3]

Exploratory demographic associations. Based on the available aggregate contingency counts, Pearson chi-square analyses did not show statistically significant associations of sex or residence with three-category HBV status ($p=0.642$ and $p=0.999$), receipt of seasonal influenza vaccine ($p=0.640$ and $p=0.250$) or three-category HPV status ($p=0.486$ and $p=0.379$). HBV knowledge classification was also not significantly associated with sex ($p=0.089$) or residence ($p=0.766$). These findings are exploratory; several three-category analyses contained small expected counts and would benefit from exact-test confirmation against the original data. [Table 4]

Table 1: Sociodemographic characteristics and vaccine-specific knowledge score distribution (n=205)

Characteristic / score	n or mean $\pm$ SD	%
Mean age, years	19.40 $\pm$ 1.11	—
Female sex	161	78.5
Male sex	44	21.5
Urban residence	127	62.0
Rural residence	78	38.0
HPV knowledge, mean $\pm$ SD (0–10)	7.42 $\pm$ 1.86	—
HPV good knowledge (score ≥ 8)	121	59.0
HPV below median (< 8)	84	41.0
HBV knowledge, mean $\pm$ SD (0–10)	8.60 $\pm$ 1.44	—
HBV good knowledge (score ≥ 9)	134	65.4
HBV below median (< 9)	71	34.6
Influenza knowledge, mean $\pm$ SD (0–10)	7.68 $\pm$ 1.73	—
Influenza good knowledge (score ≥ 8)	128	62.4
Influenza below median (< 8)	77	37.6

Footnote: Knowledge categories were determined using sample-specific medians; they are not validated cut-offs. HPV, human papillomavirus; HBV, hepatitis B virus; SD, standard deviation.

Table 2: Correct responses to 30 vaccine-related knowledge statements (n=205)

Domain	Knowledge statement (paraphrased)	Correct (%)
HPV	Sexually transmitted infection	88.3
HPV	Persistent infection can cause cervical cancer	84.4
HPV	Infection may be asymptomatic	79.5
HPV	Infection can affect males and females	82.0
HPV	Vaccination helps prevent cervical cancer	86.8
HPV	Vaccination recommended before sexual debut	74.6
HPV	HPV vaccines available in India	72.7
HPV	Multiple types of HPV vaccine exist	66.3
HPV	Benefit for persons not previously exposed	70.2
HPV	HPV infection preventable by vaccination	83.4
HBV	Spread through blood/blood products	97.1
HBV	Not spread through handshake/casual contact	94.1
HBV	Mother-to-child transmission possible at birth	94.6
HBV	Transmission through open wounds/cuts	85.9
HBV	Unsterilised syringes/needles transmit HBV	93.7
HBV	HBV carriers can transmit infection	86.8
HBV	Sexual transmission is possible	91.7
HBV	HBV infection can cause liver cancer	75.6
HBV	HBV is treatable	52.2
HBV	Hepatitis B is vaccine-preventable	88.8
Influenza	Influenza is a viral respiratory infection	90.7
Influenza	Spreads through respiratory droplets	88.8
Influenza	Can cause severe complications	81.5
Influenza	Vaccination reduces risk of infection	85.4
Influenza	Seasonal influenza vaccine required annually	72.7
Influenza	Healthcare workers should receive influenza vaccine	87.3
Influenza	Vaccination can reduce disease severity	76.6
Influenza	Vaccination protects vulnerable populations	79.0
Influenza	Vaccine immunity is not lifelong	69.8
Influenza	Outbreaks occur seasonally	83.9

Note: Item statements are paraphrased from available study materials. The original wording and scoring key should be verified against the final questionnaire before submission.

Table 3: Attitudes towards vaccination and reported preventive practices (n=205)

Domain	Response	n	%
Perception	Vaccination useful and safe	197	96.1
Perception	Insufficient evidence of usefulness	6	2.9
Perception	Insufficient evidence of safety	2	1.0
Programmes	Vaccination programmes effective: yes	195	95.1
Programmes	No/uncertain	10	4.9
Influential source	Scientific facts	139	67.8
Influential source	Senior physicians/professors	45	22.0
Influential source	Social media	16	7.8
Influential source	Family/friends/religious beliefs	5	2.4
Advice	Would advise others to vaccinate: yes	181	88.3
Advice	Would not advise others	24	11.7
HBV	Completed schedule (self-reported)	68	33.2
HBV	Awaiting next dose	29	14.1
HBV	No vaccination	108	52.7
HPV	Completed schedule (self-reported)	41	20.0
HPV	Awaiting next dose	12	5.9
HPV	No vaccination	152	74.1
Influenza	Vaccinated this winter	37	18.0
Influenza	Not vaccinated this winter	168	82.0
Screening	Screened for hepatitis: yes	36	17.6
Screening	Not screened for hepatitis	169	82.4
National programme	Previously vaccinated via programme: yes	172	83.9
National programme	No	15	7.3
National programme	Uncertain	18	8.8

Footnote: Respondent-defined completion was not checked against clinical vaccine records or schedule-specific eligibility; the national programme response does not identify receipt of HPV, HBV or influenza vaccine. Percentage 2.4 for n=5 recalculated from 205 (the source slide rounded it to 2.5).

Table 4: Association of sex and residence with selected vaccination and HBV knowledge outcomes (n=205)

Outcome / category order	Comparison	First group, counts	Second group, counts	p value
HBV status: completed / awaiting / none	Sex	Male (n=44): 17 / 5 / 22	Female (n=161): 51 / 24 / 86	0.642
HBV status: completed / awaiting / none	Residence	Urban (n=127): 42 / 18 / 67	Rural (n=78): 26 / 11 / 41	0.999
Influenza vaccinated: yes / no	Sex	Male (n=44): 9 / 35	Female (n=161): 28 / 133	0.640
Influenza vaccinated: yes / no	Residence	Urban (n=127): 26 / 101	Rural (n=78): 11 / 67	0.250
HPV status: completed / awaiting / none	Sex	Male (n=44): 6 / 3 / 35	Female (n=161): 35 / 9 / 117	0.486
HPV status: completed / awaiting / none	Residence	Urban (n=127): 29 / 8 / 90	Rural (n=78): 12 / 4 / 62	0.379
HBV knowledge: good / below median	Sex	Male (n=44): 24 / 20	Female (n=161): 110 / 51	0.089
HBV knowledge: good / below median	Residence	Urban (n=127): 84 / 43	Rural (n=78): 50 / 28	0.766

Note: Values are exploratory Pearson chi-square p values recalculated from aggregate contingency counts without continuity correction. Some expected cell frequencies are small; exact-test verification is preferable where applicable.

DISCUSSION

This survey presents self-reported vaccination knowledge, attitudes and practices among first-year medical students questioned between October and December 2025. Nearly all respondents described vaccination as useful and safe, and almost nine in ten stated that they would recommend it to others. In contrast, only one-third reported completion of HBV vaccination, one-fifth completion of HPV vaccination and fewer than one-fifth influenza vaccination during the recorded winter. These findings describe vaccine-related perceptions and reported behaviours at entry to medical training. Separate aggregate outcomes cannot establish that

the same individuals were knowledgeable but unvaccinated. Nevertheless, the differences in their frequencies suggest scope for combining early vaccine education with services that facilitate immunisation.

The comparison across antigens is informative because each vaccine presents different considerations. HBV immunisation is particularly relevant before future blood or body-fluid exposure during clinical training. HPV vaccination is a personal cancer-prevention intervention and a subject of later patient counselling, but eligibility and dose schedules depend on age, policy and clinical circumstances. Influenza vaccination is recurrent and may be influenced by seasonal programmes. These

measures should not be treated as interchangeable indicators of vaccine compliance. WHO policy documents on HPV and influenza and international personnel-immunisation guidance support vaccine-specific counselling and appropriate vaccination review across health-professional education.^[1,3,5]

The mean HBV score of 8.60/10 and strong awareness of blood-borne transmission suggest that basic prevention concepts were familiar to most participants. Yet 52.7% were classified as not vaccinated against HBV and another 14.1% had not completed the recorded schedule. Similar awareness-coverage discrepancies have been described in Indian trainees. Thote and colleagues noted incomplete HBV vaccine uptake despite relatively good knowledge in central India, whereas Chhabra and colleagues reported notable gaps in schedule completion among medical and nursing students in Uttarakhand.^[7,11] Further studies by Rathi and colleagues in India and Shrestha and colleagues in Nepal reported incomplete HBV protection among medical trainees.^[14,15] A recent Mumbai institutional study likewise emphasised absent vaccination opportunities and poor documentation among trainees.^[16] Although these reports differ in sampling and schedule definitions, they reinforce that awareness campaigns alone are unlikely to substitute for accessible vaccine services.

Comparisons with practising healthcare workers deserve separate interpretation. Garg and colleagues observed differences in HBV protection practices and vaccine coverage across occupational groups in a tertiary-care institution.^[8] Practising staff have different exposure histories, vaccination opportunities and responsibilities from first-year students aged around 19 years. The present cohort cannot estimate immunisation levels among employed healthcare providers or students already undertaking intensive clinical rotations. Its relevance lies in the opportunity to evaluate vaccine records and arrange indicated immunisations near the start of medical training, before higher-risk clinical postings. Knowledge of HPV was generally satisfactory on major causal and preventive concepts, including the association of persistent infection with cervical cancer. More detailed questions, particularly the diversity of vaccine products and local availability, revealed gaps. Such gaps matter because future providers will increasingly be expected to address misinformation and explain vaccine timing. In Bengaluru, Gollu and Gore found awareness of the causal link between HPV and cervical cancer but lower HPV vaccination coverage.^[9] Shetty and colleagues described differences in vaccine acceptability across healthcare disciplines in southern India, including a role for educational and demographic characteristics.^[10] Singh and Baliga also highlighted variation in HPV and cervical cancer knowledge across medical students.^[17] The current findings are concordant with the need for practical, inclusive counselling rather than assuming that

familiarity with cervical cancer automatically guarantees knowledge of vaccination pathways.

In the present survey, 20.0% reported a completed HPV schedule and 5.9% were awaiting another dose. These categories must not be interpreted as objective proof of under-immunisation against current WHO guidance, because the study did not record age at first dose, product, immunocompromised status, number of doses or interval between doses. Moreover, the reported completion definition may reflect instructions operative when the questionnaire was developed, not the participant's current indicated schedule. WHO recommendations have evolved to support different dose strategies in certain age groups and programmatic settings.^[1] Future surveys should collect vaccine-product and dose-date information and evaluate uptake against an explicit recommendation applicable to each respondent.

Self-reported influenza vaccination during the assessed winter was 18.0%, despite overwhelmingly positive general attitudes towards vaccination. Blank and colleagues reported 8% influenza vaccination among future healthcare workers in the United Kingdom, despite good knowledge.^[12] Their context differed, and the figures should not be interpreted as a time trend. For first-year students, influenza vaccination may not yet be viewed as relevant to future healthcare work. Perceived susceptibility, recommendations, timing and convenient campus delivery are plausible influences, but these were not directly measured as causes in the present study. Their importance could be assessed in later intervention research.

Scientific facts were the most common stated influence on vaccination opinions, followed by senior clinicians or professors. For first-year students, this finding suggests a potential role for introductory teaching by academic faculty, although the study did not test any educational intervention or identify what changed behaviour. Early curriculum activities could address HBV exposure prevention, HPV eligibility and prevention of cervical cancer, seasonal influenza recommendations, common misconceptions and the importance of documenting vaccination. Linking these activities with voluntary vaccine-record review might encourage informed decision-making. Indian research has likewise documented differences between students' stated intentions and reported HPV vaccination uptake.^[18]

The demographic comparisons did not show robust sex- or residence-related differences for any recorded vaccine status. Although proportions sometimes differed—for example, HPV completion was reported by 21.7% of female respondents and 13.6% of male respondents—the cohort was modest, heavily female and not designed to power subgroup contrasts. For HPV and HBV, several expected cell counts were small, reducing the reliability of standard chi-square approximations. A null p value does not demonstrate demographic equivalence. Without raw data, it was also impossible to model the relationships of knowledge, attitude, socioeconomic barriers,

vaccination access and previous counselling with uptake; therefore, the study cannot identify independent predictors of vaccination.

From an institutional perspective, first-year orientation or student-health visits offer practical opportunities to review vaccination records, provide evidence-based information and identify access barriers. Individual assessment could establish vaccine eligibility and documentation needs before clinical postings begin. On-campus vaccination, faculty guidance, reminders and appropriate catch-up arrangements could be tested in future prospective studies. Such studies should record dose histories, vaccine products, cost and availability constraints, perceived barriers and subsequent completion. These are proposed improvements informed by descriptive findings, not interventions tested in the present study. Strengths and limitations. A key strength is the assessment of HPV, HBV and influenza vaccines within a defined first-year MBBS cohort using separate knowledge scores, providing a baseline picture early in medical training. The participation fraction was 82.0% (205/250). However, the cross-sectional design precludes causal inference; single-college sampling and a predominantly female respondent group constrain generalisability; and voluntary response can introduce participation bias. All vaccination statuses were self-reported rather than verified against records, risking misclassification because of recall and differing interpretations of completion. The questionnaire was reportedly pretested, but the original complete instrument and validation or reliability results were unavailable. The earlier recruitment description was internally inconsistent, and complete original ethics documentation was unavailable during manuscript preparation. Respondent-level data were unavailable for adjusted analyses, exact tests, individual-level KAP comparisons and assessment of missing data. Aggregate cross-tabulations permitted exploratory chi-square analyses but not verification of individual responses. Differences between reported mean knowledge scores and item-wise correct-response percentages require reconciliation with source data before submission.

Finally, vaccination advice evolves over time and across national programmes. Aggregate completion labels should not be equated with immunological protection where dose schedule, immunity testing or eligibility were not documented. These results represent self-reported knowledge, perceptions and vaccine uptake among first-year MBBS students in late 2025. The educational stage is important: the results reflect a starting point for vaccine education and immunisation review, not occupational vaccine coverage among practising healthcare workers.

CONCLUSION

The present study identified a considerable gap between vaccination awareness, positive attitudes

and actual vaccine uptake among first-year MBBS students. Despite favourable perceptions of immunisation and satisfactory knowledge of vaccine-preventable diseases, vaccination uptake remained low, particularly for HPV and seasonal influenza, while only one-third of participants reported completing hepatitis B vaccination. These findings highlight that awareness and positive attitudes alone may be insufficient to ensure adequate vaccination coverage. The study underscores the importance of integrating structured vaccine education, vaccination status assessment and accessible immunisation services into the early stages of medical training. Strengthening vaccination practices at the beginning of medical education may improve students' protection against vaccine-preventable diseases and promote responsible preventive healthcare practices as they progress towards clinical training.

Declarations

Ethics approval and consent to participate.

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Data availability. The summary counts underlying this manuscript are reported in its tables. The availability of respondent-level study data is to be confirmed by the study custodian before journal submission.

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