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Original Article

Dentistry Section

Assessment of Awareness, Knowledge, and Education Needs Regarding Community Oral Health Services among Dental Students in Lucknow, India: A Convergent Mixed-methods Approach

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ABSTRACT

Introduction: Community Oral Health Services (COHS) play a crucial role in improving access to oral healthcare in India. Despite the growing emphasis on COHS integration in national health policy, there is a notable lack of evidence on awareness and knowledge of COHS among dental students, the future primary workforce for its implementation. Existing studies have largely assessed practising dental surgeons or medical graduates, leaving a critical evidence gap at the training level. Understanding these gaps early, during dental training, is essential to inform timely and targeted curricular reforms.

Aim: To assess the awareness, knowledge, and educational needs regarding COHS among dental students in Lucknow, India.

Materials and Methods: A convergent mixed-methods study was conducted at the Department of Public Health Dentistry, among dental students enrolled at the Faculty of Dental Sciences, King George's Medical University, and affiliated private dental colleges in Lucknow, Uttar Pradesh, India, from October 2024 to March 2025. A total of 195 dental interns, post-interns and postgraduates gave voluntary informed consent. A validated structured questionnaire assessed awareness (8 items) and knowledge (11 items) of COHS. The qualitative component involved two Focus Group Discussions (FGDs) with 22 purposively selected dental interns, analysed by thematic analysis. Demographic parameters, including age, gender, place of residence, study level, specialisation, and Institution type, were recorded. Statistical analysis was performed using Kruskal-Wallis, Mann-Whitney U tests, Spearman's correlation, and multivariate regression were applied; $p<0.05$ was considered significant.

Results: Awareness of general national health initiatives was high- Ayushman Bharat: 170/195 (87.2%), National Health Mission (NHM): 158/195 (81.0%), Pradhan Mantri Jan Arogya Yojana (PM-JAY): 154/195 (79.0%); however, dental-specific initiatives were lower; e-Dant Seva: 85/195 (43.6%) and dental care units at Primary Health Centres (PHCs): 74/195 (37.9%). Median knowledge score was 54.55% {Interquartile Range (IQR):27.27-63.64%}, significantly lower than the median awareness score of 75.00% (IQR: 50.00-87.50%). Postgraduates scored highest in both awareness and knowledge ($p<0.001$). Government Institution students showed significantly better awareness than private Institution students ($p=0.043$). FGDs revealed a disconnect between theoretical knowledge and practical exposure, with three themes: Academic knowledge, practical knowledge, and learning and training needs.

Conclusion: The study highlights gaps in dental students' awareness and knowledge of COHS, with limited field exposure and insufficient curriculum emphasis being key barriers. Integrating community-based training, COHS-focused modules, and structured rural postings into dental curricula could enhance preparedness for public health roles. These findings emphasised the need for revisions in dental education to align with national oral health priorities and improve workforce readiness for COHS implementation.

Keywords: Community health centres, Dental education, Public health dentistry, Service delivery

INTRODUCTION

Oral health is an integral component of general health, yet it remains disproportionately neglected in India's primary healthcare delivery system. Dental education is crucial for addressing public health challenges, yet India's dental curriculum lacks integration with COHS [1,2]. The National Oral Health Programme (NOHP), launched in 2014-15 under the National Health Mission (NHM), aimed to integrate oral health services across all levels of the healthcare system from Sub-Health Centres (SHCs) and PHCs to Community Health Centres (CHCs) through promotive, preventive, and curative care [3-5]. Despite this national mandate, the translation of NOHP into functional COHS at the grassroots level remains limited, largely due to inadequate workforce capacity and preparedness.

Dental students and graduates constitute the primary workforce for COHS delivery under the NOHP. However, India's dental curriculum, as prescribed by the Dental Council of India (DCI), has been criticised for its predominantly clinic-centric orientation with insufficient emphasis on community postings, public health rotations, and NOHP-specific training [2]. It was noted that most dental graduates fail to recognise the significance of community oral health, and dental Institutions do not effectively utilise internship programmes for grassroots service delivery [6]. This curricular gap directly compromises the readiness of dental graduates to function within the COHS framework envisioned by the NOHP.

Globally, Community-based Dental Education (CBDE) has been shown to improve students' knowledge, attitudes, and competency for public

health practice [7]. However, in India, data specifically examining dental students' awareness and knowledge of COHS and the NOHP remain sparse. The few available studies have assessed awareness among practising dental surgeons or medical students, leaving a critical evidence gap regarding dental students across training levels: interns, post-interns, and postgraduates. Understanding their current knowledge and educational needs, it was essential to guide targeted curriculum reforms. Lucknow, the capital of Uttar Pradesh, represents a strategically important setting for the present study. As one of India's most populous and health-burdened states, it hosts both Government and private dental Institutions, enabling a comparative assessment of Institutional differences in COHS education. The co-existence of urban and peri-urban populations also mirrors the heterogeneity of dental education contexts across north India, lending the findings transferability to similar settings nationally. Hence, the study aimed to assess the awareness, knowledge, and educational needs regarding COHS among dental students in Lucknow, India.

The null hypothesis was that there was no significant difference in awareness and knowledge of COHS among dental students based on demographic characteristics, including age, gender, place of residence, study level, and Institution type.

The alternate hypothesis was that there are significant differences in awareness and knowledge of COHS among dental students based on demographic characteristics, including age, gender, place of residence, study level, and Institution type.

MATERIALS AND METHODS

A convergent mixed-methods study was conducted among dental students enrolled at the Faculty of Dental Sciences, King George's Medical University, and affiliated private dental colleges in Lucknow, Uttar Pradesh, India. Data collection was carried out from October 2024 to March 2025. Ethical approval was obtained from the Institutional Ethics Committee (XXVIII-PGTSC-IIA/P5) on 2nd September, 2024. Written informed consent was obtained from all participants before data collection. All responses were anonymised to ensure confidentiality. The study adhered to Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for observational studies and Consolidated criteria for Reporting Qualitative research (COREQ) guidelines for qualitative research [8].

Sample size calculation: Sample size was calculated using the formula for comparison of two proportions, based on values derived from a pilot study of 30 participants (p1=0.63, p2=0.81), with a 95% confidence interval and 80% statistical power, yielding a minimum required sample of 195 participants. A total of 195 dental students were enrolled using convenience sampling; participants were recruited consecutively, and the Google Form was closed upon reaching the required sample size. Participants of the pilot study were not included in the final study sample.

Inclusion criteria: Dental students (interns, post-interns, and postgraduates) enrolled in government or private dental colleges in Lucknow who were willing to provide informed consent were included in the study.

Exclusion criteria: Post-interns are the dental graduates who have not yet commenced formal postgraduate specialisation. Students who did not complete the questionnaire were excluded from the study.

Study Procedure

A structured quantitative questionnaire was developed by a panel of four public health dentistry experts with a minimum of ten years of experience in community dental research in English. The questionnaire underwent content validation by seven subject matter experts, who rated each item on a four-point scale (I-CVI=0.83; kappa=0.85). The internal consistency of the knowledge scale was assessed using Cronbach's alpha coefficient (α=0.78). Necessary modifications were made based on validation results. Awareness was measured using eight items with yes/no/don't know responses, with a maximum score of eight. Knowledge was evaluated using 11 multiple-choice questions, with one correct answer per item, yielding a maximum score of 11. In all the questions, a 'yes' response was scored one, and 'no' and 'don't know' responses were scored zero. Awareness scores were calculated as the percentage of correct 'yes' responses out of a maximum score of 8, expressed as a percentage {(total awareness score/8) × 100}. Knowledge scores were calculated as the percentage of correct responses out of a maximum score of 11, expressed as a percentage {(total knowledge score/11) × 100}. As the data were non normally distributed, scores are reported as median with Interquartile Range (IQR). For descriptive purposes, awareness and knowledge levels were categorised as: low (score <50%), moderate (score 50-74%), and high (score ≥75%), based on the percentage scores derived from the respective maximum scores of 8 (awareness) and 11 (knowledge) items. The questionnaire is provided as an Annexure.

The qualitative phase involved FGDs with 22 dental interns from two Institutions:

- Faculty of Dental Sciences, King George's Medical University, Lucknow (Government Institution; n=11), and
- Career Postgraduate Institute of Dental Sciences and Hospital, Lucknow (Private Institution; n=11),

They were purposively selected on the following criteria: final-year dental interns who were actively enrolled in the internship programme at the time of data collection, and who had not participated in the pilot or pre-testing phases. This stratified purposive sampling approach ensured maximum variation in the Institutional context and provided diverse perspectives within the qualitative dataset. The FGD interview guide was developed through a comprehensive review of existing literature on COHS and dental education [6,7,9,10]. The guide development and validation process is as follows:

1) **Expert panel content and face validation:** A panel of seven public health dentistry specialists (minimum 10 years of community research experience) reviewed the draft guide for content validity (relevance and comprehensiveness of all questions in addressing COHS awareness, knowledge, and educational needs) and face validity (clarity of language, appropriateness for dental interns, and adequacy of probing questions). The guide was iteratively refined based on expert consensus feedback.
2) **Pre-testing:** The validated guide was subsequently pre-tested with five dental interns for language clarity, question flow, appropriateness, and time required per question. Minor linguistic modifications were made based on pre-test findings. The five interns who participated in the pre-test were excluded from the final FGD sample.

Discussions were conducted by a trained female moderator (first author) in the presence of two note-takers, audio-recorded with participant consent, and transcribed verbatim. Transcripts were analysed manually using thematic analysis, wherein data were coded inductively and organised into themes and subthemes. Thematic saturation was assessed after each FGD. Following the second FGD (conducted at the Private institution), no new themes or subthemes emerged beyond those identified in the first FGD (Government Institution), confirming that thematic saturation was achieved after the second FGD. Trustworthiness of qualitative findings was ensured through peer debriefing, member checking, and triangulation with quantitative results. The study followed COREQ guidelines to ensure reporting transparency [8].

STATISTICAL ANALYSIS

Data were organised in Microsoft Excel and analysed using IBM Statistical Package for Social Sciences (SPSS) version 24.0 (IBM

Corp, NY, USA). Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as means and standard deviations. Kruskal-Wallis and Mann-Whitney U tests assessed differences in awareness and knowledge across groups. Spearman's correlation analysed relationships between awareness and knowledge scores, while multivariate regression analysis identified predictors of awareness, knowledge, and overall performance. Manual thematic analysis was used to categorise qualitative findings into key themes. Peer debriefing and member checking ensured validity, and triangulation of quantitative and qualitative findings provided a comprehensive understanding.

RESULTS

The present study included 195 dental students, with demographic characteristics summarised in [Table/Fig-1]. Awareness of National health initiatives was high, particularly for Ayushman Bharat (87.2%), National Health Mission (81.0%), and Pradhan Mantri Jan Arogya Yojana (PM-JAY) (79.0%), whereas dental-specific initiatives such as e-Dant Seva (43.6%) and dental care units at PHCs (37.9%) had lower recognition [Table/Fig-2].

Knowledge levels varied; 82.6% correctly identified the goal of Ayushman Bharat, but only 6.2% were aware of PM-JAY-covered services. Knowledge of the NOHP (65.6%) was higher than that of opportunistic dental screening at SHC-HWCs (44.1%). The median awareness score was 75.00% (IQR: 50.00-87.50%), while the median knowledge score was 54.55% (IQR: 27.27–63.64%), indicating a moderate knowledge gap [Table/Fig-2].

Statistical analysis revealed significant associations between awareness, knowledge, and demographic factors. Postgraduates scored highest in awareness ($p<0.001$) and knowledge ($p<0.001$), while Government Institution students had significantly better awareness than private Institution students ($p=0.043$) [Table/Fig-3]. Multivariate regression showed that males and interns scored lower, while Government Institution students outperformed private Institution students in both awareness and knowledge [Table/Fig-4]. Awareness and knowledge were moderately correlated (Spearman's rho=0.471, $p<0.001$), suggesting an interdependent relationship between these domains.

Baseline characteristics		n (%)	Baseline characteristics		n (%)
Age (in years)	20-25	99 (50.8)	Type of Institution	Govt.	92 (47.2)
	26-30	82 (42.0)		Private	103 (52.8)
	>30	14 (7.2)	Specialisation (among PGs)	Conservative Dentistry and Endodontics	4 (6.5)
	Mean±SD	25.94±2.62		Paediatric and preventive dentistry	7 (11.4)
Gender	Male	72 (36.9)		Prosthodontics Crown and Bridges	4 (6.6)
	Female	123 (63.1)		Public health dentistry	35 (57.4)
Place	Urban	136 (69.7)		Orthodontics and dentofacial orthopaedics	4 (6.6)
	Rural	59 (30.3)		Oral and maxillofacial surgery	2 (3.3)
Study level	Intern	100 (51.2)		Periodontology	2 (3.3)
	Post-intern	34 (17.4)		Oral pathology	3 (4.9)
	Postgraduates	61 (31.3)			

[Table/Fig-1]: Distribution of respondents according to baseline characteristics (N=195).

Awareness item	Awareness n (%)
About NHM (National Health Mission)?	158 (81.0)
About Ayushman Bharat?	170 (87.2)
About HWC (Health and wellness centres)?	151 (77.4)
About PM-JAY (Pradhan Mantri Jan Arogya Yojana)?	154 (79.0)
About NOHP (National Oral Health Programme)?	153 (78.5)
About e-Dant Seva app?	85 (43.6)
Dental care units at sub-centre HWC?	74 (37.9)
Dental care units at the secondary level of healthcare	94 (48.2)
Knowledge Item	**Correct n (%)**
Main goal of Ayushman Bharat	161 (82.6)
Component(s) of Ayushman Bharat?	110 (56.4)
Service(s) are delivered by HWC (Health and Wellness Centres)	94 (48.2)
Services are covered under PM-JAY	12 (6.2)
PM-JAY provides health assurance for	75 (38.5)
Main goal of NOHP	128 (65.6)
Minimum essential qualification of a Community Health Officer (CHO)	41 (21.0)
Oral health prevention and promotion by	169 (86.7)
At SHC-HWC, opportunistic dental screening and referrals by	86 (44.1)
At PHC-HWC, opportunistic dental screening, examination and management by	105 (53.8)
Feature(s) of e-Dant Seva app	74 (37.9)

[Table/Fig-2]: Distribution of subjects according to item-wise awareness level and knowledge level (N=195).

In the qualitative phase, 22 dental interns (Government and Private Institutions) participated in FGDs to explore COHS-related education needs [Table/Fig-5,6].

Three major themes emerged from the FGDs [Table/Fig-7]:

1) Academic Knowledge, encompassing three subthemes: Health Programmes, Oral Health Programmes, and Healthcare Delivery System. Students demonstrated awareness of programme names such as PM-JAY and Ayushman Bharat; however, they exhibited limited understanding of programme components, particularly regarding NOHP structure and Health and Wellness Centres (HWCs);
2) Practical knowledge, comprising four subthemes: field exposure, rural postings, infrastructure challenges, and staff pattern and roles. Government institution students demonstrated relatively better field exposure through CHC/PHC visits and rotary rural postings during internship; however, their focus on patient quotas limited in-depth understanding of COHS delivery. Private Institution students lacked comparable practical exposure altogether. Infrastructure deficiencies at PHCs, including absence of dental surgeons and equipment, and a disconnect between taught staff patterns and real-world observations, were key concerns.
3) Learning and training needs, with three subthemes: reasons for training needs, barriers, and facilitators. Students recognised the importance of COHS knowledge for job opportunities under NOHP and community oral health promotion. Key barriers included an already overburdened syllabus and quota-driven internship demands, while facilitators included mandatory field visits, examinable COHS content, and innovative teaching methods such as research projects and group discussions.

Variables	Categories	Awareness %		Knowledge %	
		Median	IQR	Median	IQR
Age (in years)	20-25	62.50	50 - 75	45.45	18.18 - 72.73
	26-30	75.00	50 - 87.5	54.55	36.36 - 63.64
	>30	87.50	62.5 - 100	63.64	54.55 - 63.64
	Kruskal-Wallis test	H=5.52, p=0.063		H=8.23, p=0.016	
Gender	Male	62.50	50 - 75	54.55	27.27 - 59.09
	Female	75.00	50 - 87.5	54.55	36.36 - 72.73
	Mann-Whitney test	z=1.30, p=0.194		z=1.62, p=0.105	
Place	Urban	75.00	50 - 87.5	54.55	36.36 - 63.64
	Rural	62.50	50 - 75	45.45	27.27 - 63.64
	Mann-Whitney test	z=1.46, p=0.144		z=0.92, p=0.356	
Study level	Intern	62.50	50 - 75	45.45	18.18 - 63.64
	Post-intern	62.50	37.5 - 75	45.45	27.27 - 63.64
	Postgraduates	75.00	62.5 - 87.5	63.64	54.55 - 72.73
	Kruskal-Wallis test	H=19.65, p<0.001		H=22.98, p<0.001	
Specialisation	Conservative dentistry and Endodontics	81.25	37.5 - 87.5	63.64	31.82 - 72.73
	Paediatric and Preventive Dentistry	75.00	62.5 - 87.5	63.64	54.55 - 81.82
	Prosthodontics Crown and Bridges	62.50	50 - 81.25	59.09	45.45 - 72.73
	Public Health Dentistry	87.50	75 - 100	72.73	45.45 - 81.82
	Orthodontics and Dentofacial Orthopaedics	50.00	25 - 75	40.91	13.64 - 59.09
	Oral and Maxillofacial Surgery	75.00	75 - 75	45.45	45.45 - 45.45
	Periodontology	56.25	25 - 87.5	36.36	9.09 - 63.64
	Oral Pathology and Microbiology	62.50	50 - 75	50.00	36.36 - 63.64
	Kruskal Wallis test	H=11.0, p=0.139		H=11.3, p=0.125	
Type of Institution	Government	75.00	62.5 - 87.5	54.55	36.36 - 72.73
	Private	62.50	50 - 87.5	45.45	27.27 - 63.64
	Mann-Whitney test	z=2.02, p=0.043		z=1.83, p=0.067	

[Table/Fig-3]: Association of awareness and knowledge with demographic characteristics.
p<0.05 is considered statistically significant. H=Kruskal-Wallis test statistic; z=Mann-Whitney U test statistic.

Meta-inference analysis reinforced these findings, with quantitative results aligning with qualitative themes. Limited practical exposure in the curriculum mirrored lower awareness and knowledge scores, particularly among interns and students from private Institutions. Government Institution students, having greater exposure to outreach programmes, exhibited higher awareness and knowledge scores. Participants also highlighted a preference for Private facilities over public health programmes, despite the underutilisation of initiatives like Ayushman Bharat and NOHP.

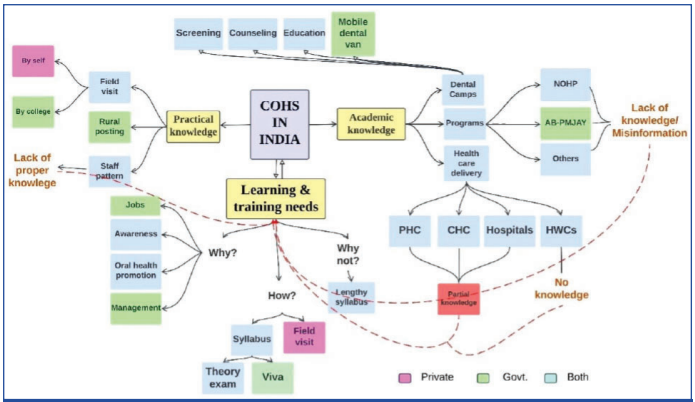
These findings suggest an urgent need for curriculum modifications to incorporate community-based training, structured COHS modules, and hands-on field exposure, thereby improving workforce preparedness for public health dentistry.

Dependent variables	Categories	B	SE	t-value	p-value	Effect size
Awareness %	Intercept	81.86	7.07	11.58	0.000	0.015
	20-25 y	-13.44	7.93	-1.69	0.092	
	26-30 y	-12.54	6.90	-1.82	0.071	0.017
	>30 y	Ref	-	-	-	
	Male	-8.91	3.52	-2.53	0.012	0.033
	Female	Ref	-	-	-	
	Urban	4.86	3.57	1.36	0.175	0.010
	Rural	Ref	-	-	-	
	Intern	-8.25	5.01	-1.65	0.101	0.014
	Post-intern	-18.60	5.24	-3.55	<0.001	0.063
	Postgraduates	Ref	-	-	-	
	Govt.	8.93	3.38	2.64	0.009	0.036
	Private	Ref	-	-	-	
Knowledge %	Intercept	66.36	7.04	9.42	0.000	0.009
	20-25 years	-10.09	7.91	-1.28	0.203	
	26-30 years	-9.82	6.88	-1.43	0.155	0.011
	>30 years	Ref	-	-	-	
	Male	-6.72	3.51	-1.91	0.057	0.019
	Female	Ref	-	-	-	
	Urban	2.32	3.56	0.65	0.515	0.002
	Rural	Ref	-	-	-	
	Intern	-15.30	4.99	-3.06	0.003	0.048
	Post-intern	-18.24	5.22	-3.49	0.001	0.061
	Postgraduates	Ref	-	-	-	
	Govt.	8.41	3.37	2.50	0.013	0.032
	Private	Ref	-	-	-	

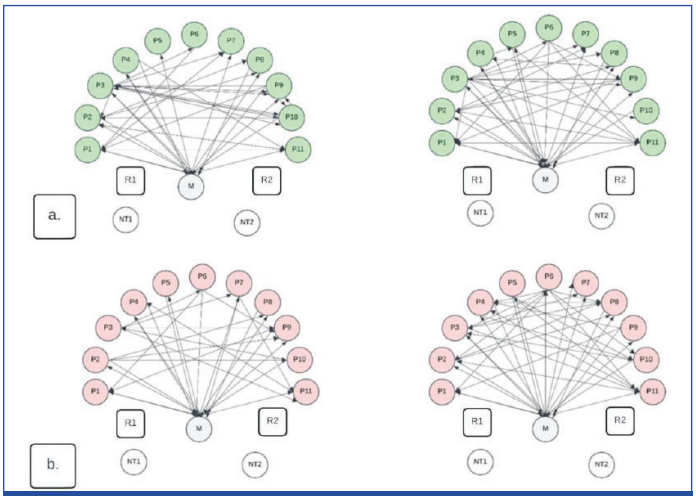
[Table/Fig-4]: Multivariate regression analysis showing the relationship of awareness and knowledge level.
B is the unstandardised regression coefficient; SE is the standard error of the regression coefficient. t-value is the ratio of B to SE; Ref = Reference category. Regression coefficients for all other categories are interpreted relative to the reference category; p<0.05 is considered statistically significant. Overall model fit: Awareness model $R^2 = 0.418$, $F(7, 187) = 19.19$, $p<0.001$; Knowledge model $R^2 = 0.322$, $F(7, 187) = 12.69$, $p<0.001$. Individual effect sizes represent partial η^2 for each predictor variable.

DISCUSSION

Universal Health Coverage holds significant importance and has been highlighted in key global and National frameworks, including the Alma-Ata Declaration [11], the Sustainable Development Goals agenda [12], and the Indian National Oral Health Programme [3]. One approach to strengthening COHS delivery through the NOHP is capacity building of service providers, including dental students, as skilled graduates constitute an essential driving force for National health systems [3,13].



[Table/Fig-5]: Concept map showing qualitative analysis.



[Table/Fig-6]: Sociograms depicting group dynamics among 11 dental interns (P1-11) in the FGDs with moderators (M) and two note-takers (NT1, NT2) at the government Institute (green colour) for domain: overall understanding, learning and training needs (a) Sociograms depicting group dynamics among 11 dental interns (P1-11) in the FGDs with moderator (M) and two note-takers (NT1, NT2) at a private Institute (pink colour) for: overall understanding, learning and training needs. (b) R1 and R2 depict two audio recorders.

The current study assessed several demographic factors, including age, study level, and Institution type which impacted the understanding of COHS among dental students. Qualitative results further confirmed the various dimensions of understanding and revealed the need for training among the dental health students. Based on the results of the present study, the null hypothesis was rejected. Statistically significant differences were identified in both awareness and knowledge scores based on study level and Institution type. Postgraduates demonstrated significantly higher awareness and knowledge than interns and post-interns, and students from government Institutions demonstrated significantly higher awareness than those from private Institutions, thereby confirming the alternate hypothesis.

The present study found that awareness about NOHP was 78.5%. Similar findings (69%) were reported by Saroshe S et al., 2024 in India [14]. About the Ayushman Bharat Scheme, NHM, and PM-JAY, the self-reported awareness was highest, i.e., 87.2%, 81%, and 79%, respectively. Knowledge varied for different programmes and domains like NOHP (65.6%), goal of Ayushman Bharat (82.6%) which showed adequate knowledge, though lower knowledge was found regarding components of Ayushman Bharat (56.4%), HWCs services (48.2%), dental screening at SHC-HWC (44.1%), digital oral platform like e-Dant-seva app (37.9%) and oral health services under PM-JAY (6.2%) when assessed using knowledge questionnaire. Similar findings were reported in the previous study by Agrawal P et al., 2023 [15], which reported 44.7% awareness about NHM among second-year MBBS graduates. 55% Auxiliary Nurse Midwife (ANM) [16] and 46% Accredited Social Health Activist (ASHA) workers [16] had an understanding of the Ayushman Bharat Scheme. Reddy NKK et al., 2020, also reported awareness around 50% among tertiary healthcare providers about PM-JAY [17]. Though positively correlated (Rs=0.47), the scores declined for knowledge, showing the over-estimation of awareness scores due to the self-reported nature of the questionnaire, particularly for domains like oral health services under programmes, qualification and roles and responsibilities of health personnel at healthcare

Theme	Subtheme	Inferences	Quotes
Academic knowledge	Health programmes	Students demonstrated awareness of the names of healthcare programmes; however, they exhibited limited knowledge or held misconceptions about the specific details and components of these programmes.	"There are programmes like PMJAY, National Health Mission" -Govt. intern "I've read about Ayushman Bharat programme which runs at national level in PHD textbooks, Govt. ads and flyers." -Pvt. intern
	Oral health programmes	Students could recall oral health programmes like school oral health initiatives and water fluoridation, commonly discussed in PHD lectures. A few students mentioned NOHP but lacked an understanding of its structure and components.	"We have been taught about programmes like Tattle tooth, Bright smiles bright future, water fluoridation programmes in our lectures" -Govt. intern "I've heard of NOHP but not sure of its components." – Pvt. intern
	Healthcare delivery system	Most students were familiar with the healthcare delivery model but had limited knowledge regarding Health & Wellness Centres and insufficient understanding of the staff structure and resources at various healthcare levels, particularly at PHC and community levels.	"We've been taught about COHS at community, PHC, CHC and tertiary levels in PHD lectures but I don't remember staff pattern as of now." – Govt intern "PHC provides services like early diagnosis, regular health check-ups, vaccination and medication." -Pvt. intern
Practical knowledge	Field exposure	Government students, having visited CHCs and PHCs as part of their final-year training, demonstrated better field exposure compared to Private students, who lacked comparable practical experience.	"We have visited CHC and PHC adopted by our Institute in final year"-Govt. intern "I've visited a PHC by myself, out of interest, near my home but couldn't find oral healthcare delivery over there." -Pvt. intern
	Rural posting	Government students had rotary rural postings during internships, enabling them to gain familiarity with PHC infrastructure. However, their focus was primarily on meeting patient quotas, which limited in-depth understanding. Private students lacked exposure to rural postings altogether.	"We've rotary rural postings at PHC in internship and have quota of patients there." -Govt. intern "Our practical syllabus should include interaction with ASHA workers and conducting field work"- Pvt intern
	Infrastructure challenges	Students reported a lack of essential materials and manpower at PHCs, coupled with an over-reliance on referrals to tertiary centers. These challenges created a sense of demotivation toward patient care.	"Dentists are willing, but without materials, they can't treat patients..." – Govt intern "In my PHC visit, there was no dental surgeon or functional dental chair." – A Pvt intern "They just refer cases to tertiary centres; even basic equipment isn't available...." –Another Pvt intern
	Staff pattern and roles	Students observed a discrepancy between what they were taught about staff patterns and roles in lectures and the reality in healthcare settings. This disconnect, along with misinformation, affected their understanding of the roles of healthcare workers.	"We have studied about the staff pattern in final year but as per our visit, it's not very usual to see things like that." -Govt. intern "ASHA workers could demonstrate brushing technique, basic health education and apply pit and fissure sealants also, I think" -Pvt intern

Learning and training needs	Reasons for training needs	Students emphasised the importance of understanding Community Oral Health Services (COHS) to promote oral health, manage cases in rural areas, job opportunities under programmes like NOHP, builds leadership qualities and collaborate effectively with public health systems.	"If faculty ask questions about these topics, we will take them seriously." – Govt intern "Knowing about COHS will open up job opportunities like working under NOHP." – Pvt intern "We should be taught how to collaborate with existing health systems like Ayushman Bharat." – Govt intern
	Barriers	Include an already lengthy syllabus, limited time during internships due to clinical and quota-related demands, and inadequate emphasis on oral health in existing public health systems. Interns feel overburdened and suggest that additional topics might clash with their schedules unless introduced strategically.	"Adding more topics might overburden the already lengthy syllabus." – Govt intern "We are already occupied with quotas and clinical work…"– Pvt intern
	Facilitators	Include making COHS examinable (even through minor additions like MCQs), introducing mandatory field visits to PHCs/CHCs, and using innovative teaching methods such as group discussions or research projects during internships. Interns believe hands-on exposure including interactions with the grass-root workers will significantly enhance their understanding.	"Field visits to PHCs and CHCs should be mandatory in our internship." – Pvt intern "If we include these topics in exams, even as MCQs, students will study them." – Govt intern "Mandatory rural postings will enhance understanding of real-world challenges." – Pvt intern "Research paper submissions during internship would help us understand community health." – Pvt intern

[Table/Fig-7]: Comparative analysis of COHS themes across government and private Institutions.

levels. Variation in awareness at different levels may be due to the difference in the education level and programmatic information among the participants of the studies. Adequate awareness could be corroborated by qualitative findings in the meta-inference that recent meritorious graduates learn about the health programmes' list, although in limited depth, for their final year viva and post-graduate entrance examinations, besides the occasional exposure to Government advertisements about the health schemes. Students reported limited motivation to engage with the details of health services and programmes, as these topics were perceived to have limited relevance to their examination requirements. Also, the knowledge was found more in the Government students than in the private students (p=0.043). This could be aligned with the qualitative finding, as most of the students in public health postings are engaged in outreach activities. Although Government Institution students had greater exposure to rural postings at PHCs during their internship, their factual knowledge regarding COHS remained limited. Qualitative findings suggested that practical visits were primarily oriented toward clinical service delivery rather than structured learning about COHS components, staff patterns, and oral health services covered under the NOHP. However, this explanation is based on participant perceptions reported during FGDs and should be interpreted with caution. The oral health component covered by NOHP is completely untouched, even at the rural postings. Incorporating structured modules on COHS within the final year curriculum, emphasising hands-on exposure to National health programmes, particularly NOHP, and integrating oral health into broader healthcare frameworks can bridge these gaps. Such initiatives would align educational outcomes with public health goals, ultimately improving oral health service delivery in underserved communities. The overall understanding showed an increase with age and study level (H=0.007 and 29.68 resp.), which is in line with the findings from a previous study by Reddy NKK et al., 2020, which may be due to programmatic information [17]. As per Gambhir RS et al., 2016, most dental graduates fail to recognise the significance of community oral health [6]. They are unaware of their societal responsibilities, as dental Institutions do not effectively utilise internship programmes to deliver services at the grassroots level [6], which is backed up by the current study, which showed more knowledge among Public Health Dentistry postgraduates than dental graduates and interns, which can be due to the academic and practical proximity with the community settings, service-based learning, and oral health programmes.

The present study's mixed-methods design integrates quantitative and qualitative insights, offering a comprehensive assessment of COHS awareness and education needs among dental students. Validated instruments ensured reliable data collection, while the inclusion of government and private Institution participants provided a balanced perspective.

Limitation(s)

The present study's cross-sectional nature, geographic focus on Lucknow, and reliance on self-reported data, which may introduce biases is major limitation. The convenience sampling methodology may limit generalisability to other regions of India. The FGD sample was limited to dental interns from two Institutions, which may not capture the full spectrum of perspectives across dental education settings in India; this should be considered when interpreting the qualitative findings. The exclusion of practising dentists at CHCs and PHCs limits insights into real-world implementation. To address these gaps, structured COHS modules, hands-on field training, and innovative teaching methods like research projects and case-based learning should be incorporated into dental curricula. Strengthening public healthcare infrastructure, fostering Institutional collaborations, and conducting longitudinal studies will help evaluate the long-term impact of COHS education.

CONCLUSION(S)

The study highlights gaps in COHS awareness, knowledge, and educational preparedness among dental students, underscoring the need for a comprehensive community-focused educational framework. By integrating community engagement, practical training, and interdisciplinary learning into dental curricula, these gaps can be bridged. Such curricular modifications may enhance dental professionals' preparedness and contribute to improving oral health outcomes, especially in underserved communities where access to care remains a challenge.

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ANNEXURE:

Questionnaire:

Awareness and Knowledge among dental students about Community Oral Health Services in India

Awareness:

1. Are you aware of NHM (National Health Mission)?
   Yes
   No
   I don't know
2. Are you aware of Ayushman Bharat?
   Yes
   No
   I don't know
3. Are you aware of HWC (Health and wellness centres)?
   Yes
   No
   I don't know
4. Are you aware of PM-JAY (Pradhan Mantri Jan Arogya Yojana)?
   Yes
   No
   I don't know
5. Are you aware of NOHP (National Oral Health Programme)?
   Yes
   No
   I don't know
6. Are you aware of the e-Dant Seva app?
   Yes
   No
   I don't know
7. Are there dental care units available at sub-centre HWC?
   Yes
   No
   I don't know
8. Are there dental care units at the secondary level of healthcare?
   Yes
   No
   I don't know

Knowledge:

1. What is the main goal of Ayushman Bharat ?
   a. To achieve universal health coverage in India
   b. To achieve oral health of children in India
   c. To decrease mortality rate of elderly in India
   d. I don't know
2. What is/are the component(s) of Ayushman Bharat?
   a. Health and wellness centre (HWC)
   b. PM-JAY (Pradhan Mantri Jan Arogya Yojana)
   c. RBSK (Rashtriya Bal SwasthyaKaryakram)
   d. Both a and b
   e. I don't know
3. Which of the following service(s) are delivered by HWC (Health and wellness centres)?
   a. ENT problems
   b. Basic Oral Health Care
   c. Family Planning
   d. All of the above
   e. I don't know

4. Which of the following services are covered under PM-JAY (Pradhan Mantri Jan Arogya Yojana)?
a. Root Canal Treatment
b. Restorative procedures
c. Oral & Maxillofacial Surgery
d. All of the above
e. I don't know
5. PM-JAY provides health assurance for secondary and tertiary healthcare hospitalization:
a. Upto 2.5 lakh/family/year
b. Upto 5 lakh/family/year
c. Upto 10 lakh/family/year
d. I don't know
6. What is the main goal of NOHP (National Oral Health Programme)?
a. To provide comprehensive oral health care
b. To determine prevalence of initial caries
c. To provide free dental treatment
d. I don't know
7. What is the minimum essential qualification of a CHO (Community Health Officer)?
a. Nursing graduate
b. MBBS graduate
c. BDS graduate
d. I don't know
8. Who provides oral health prevention and promotion at community level?
a. Local Dais
b. A dentist/ Medical Officer
c. ASHA (Accredited Social Health Activist) and Community Health Officer (CHO)
d. I don't know
9. At Sub Health Centres (SHC-HWC) who performs opportunistic dental screening and referrals?
a. Anganwadi workers
b. Community Health Officer (CHO)
c. ASHA (Accredited Social Health Activist)
d. I don't know
10. At Primary Health Centre (PHC-HWC), who performs opportunistic dental screening and does examination & management of referred cases?
a. ANM (Auxiliary Nurse Midwife)
b. Medical Officer (MO)/ Dentist
c. ASHA (Accredited Social Health Activist)
d. I don't know
11. Which one of the following is/are the feature(s) of e-Dant Seva app?
a. Symptom Checker
b. Intraoral scanner
c. Premalignant lesion detector
I don't know