

Dental Health Education Programs and their Effectiveness in Promoting Oral Hygiene: Lessons for Public Health Policy

Dr. Mynampati Chaitanya^{1*} | Dr. Azlan Bin Jaffar²

¹Ph.D. Research Scholar, Department of Dentistry, Lincoln University College, School of Dentistry, Malaysia.

²Associate Professor in Public Health Dentistry, Lincoln University College, School of Dentistry, Malaysia.

*Corresponding Author: mynampati.phdscholar@lincoln.edu.my

Citation: Chaitanya, M., & Jaffar, A. (2025). Dental Health Education Programs and their Effectiveness in Promoting Oral Hygiene: Lessons for Public Health Policy. *International Journal of Global Research Innovations & Technology*, 03(03), 152–164. <https://doi.org/10.62823/ijgrit/03.03.8012>

ABSTRACT

Oral diseases are the world's most prevalent noncommunicable conditions, affecting roughly half of humanity and imposing substantial quality-of-life and economic burdens. This paper examines how dental health education (DHE) programs influence oral-hygiene knowledge, behaviors, and clinical outcomes, and distills lessons for public health policy with a particular focus on India and Malaysia. Using secondary sources including the WHO Global Oral Health Status Report (2022), India's National Oral Health Programme (NOHP) guidelines, Malaysia's National Oral Health Strategic Plan (2022–2030), and recent systematic reviews and trials, we synthesize evidence on effectiveness and program design. Across diverse settings, DHE consistently improves oral-health knowledge and self-care behaviors (e.g., twice-daily brushing) and yields short-term reductions in plaque and gingival inflammation, especially when delivered in schools, grounded in behavior-change theory, and reinforced over time; effects on dental caries are less consistent. Malaysia's long-standing, school-embedded oral-health system and its current strategic plan illustrate how integrated delivery can achieve high reach and equity-oriented reforms. In India, the NOHP provides a national framework and operational guidance for health-facility and community-based education; however, monitoring and population-level outcomes are constrained by dated national surveillance (e.g., the 2002–03 National Oral Health Survey), underscoring the need for refreshed data systems. Policy implications include embedding DHE within school timetables and primary care, annual teacher training, standardized indicators (including simple clinical indices where feasible), equitable targeting of underserved populations, and integration with universal health coverage initiatives. By consolidating comparative evidence from India and Malaysia against global guidance, the paper offers actionable design and monitoring choices for scaling effective, equitable dental health education in low- and middle-income settings.

Keywords: Dental Health Education (DHE), Oral Hygiene, Public Health Policy, India, Malaysia, School Dental Programs, Health Promotion, Secondary Data Analysis, Oral Health Inequalities, Preventive Dentistry.

Introduction

Oral health is an integral part of overall health and quality of life. It refers to the condition of the mouth, teeth, gums, and related orofacial structures that allow individuals to eat, speak, and socialize without pain, discomfort, or embarrassment. Although most oral conditions are largely preventable, they persist as one of the most widespread noncommunicable diseases globally.

Current estimates suggest that nearly 3.7 billion people worldwide live with at least one oral disease, and untreated dental caries of permanent teeth remain the most common condition. The 2022 Global Oral Health Status Report draws attention to stark disparities, noting that disadvantaged and marginalized populations carry a disproportionate disease burden.

Beyond clinical signs, oral disease imposes broad human and societal costs pain, functional limitation, social stigma, lost schooling or work days, and high treatment costs for individuals and health systems. Especially in low- and middle-income settings, preventive services, surveillance, and treatment remain under-resourced, leading to high unmet needs and persistent prevalence.

Global Burden of Oral Diseases (WHO, 2022)

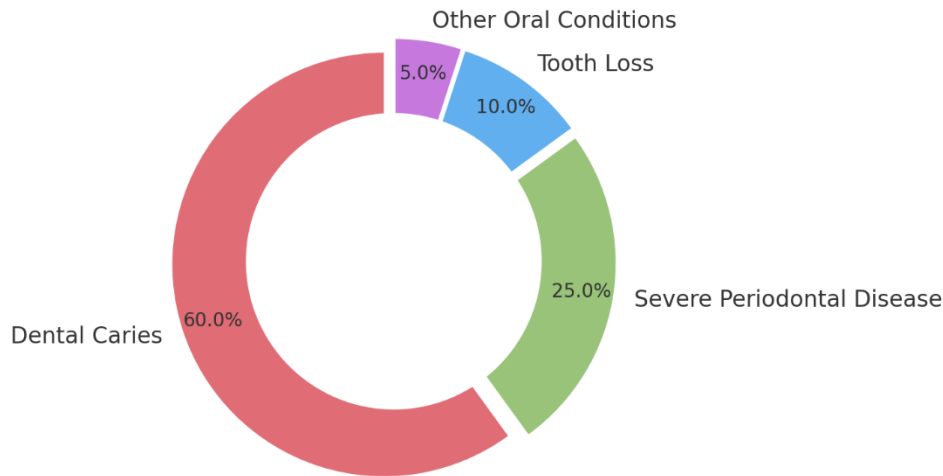


Figure 1: Global Burden of Oral Diseases

Source: WHO Global Health Status Report, 2022

Because a large share of oral disease (especially caries, gingivitis, periodontal disease) is preventable and modifiable via self-care (brushing, flossing, diet) and simple public health interventions, dental health education (DHE) has long been a core tool in public oral health strategies. Effective education can improve knowledge, attitudes, and practices (KAP), reinforce behavior change, and reduce early disease markers (e.g. plaque, gingival inflammation). However, its real-world efficacy, sustainability, and translation into population-level disease reduction depend heavily on program design, delivery systems, monitoring, and context.

In India, the National Oral Health Programme (NOHP) was launched to integrate preventive, promotive, and curative oral health services into existing health infrastructure. Yet, actual population-level monitoring remains limited, and the last national oral health survey (NOHS 2002–03) is now decades old. In contrast, Malaysia has a long tradition of School Dental Service (SDS) and preschool oral programs, embedded within its primary health structures, with systematic outreach to children. The Malaysian SDS has high coverage, with student perceptions and process evaluations documented in scholarly literature.

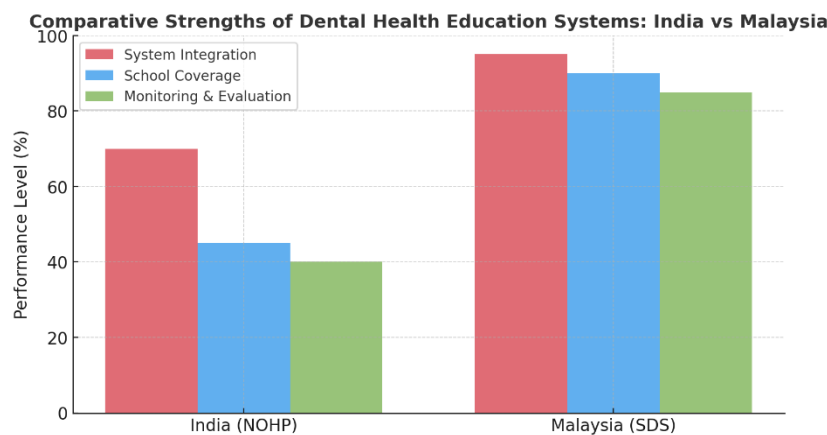


Figure 2: Global Burden of Oral Diseases

Source: Comparative Strengths of Dental Health Education Systems

This paper aims to (1) synthesize global evidence on the effectiveness of DHE programs (in terms of KAP and clinical outcomes), (2) map how DHE is structured and delivered in India and Malaysia, (3) compare strengths, constraints, and gaps, and (4) distill policy lessons for scalable, equitable DHE in low- and middle-income settings. By drawing insights from comparative secondary data, the paper seeks to contribute actionable guidance for public health policymakers and planners.

Review of Literature

• What Dental Health Education (DHE) Seeks to Change: KAP Outcomes

Across decades, DHE has most consistently demonstrated improvements in knowledge, attitudes, and practices (KAP) related to oral hygiene. A frequently cited review of school and community programs reported meaningful gains in knowledge and self-care behaviours (e.g., twice-daily brushing, plaque disclosure use) across most included studies, although effect sizes and durability varied by intensity and follow-up period. More recent syntheses echo this pattern: education works best when repeated, interactive, and reinforced in the environment where behaviours are performed (e.g., classroom, school, family). These findings align with WHO's core message that most oral conditions are largely preventable through regular hygiene and healthy behaviours supported by public-health action.

Short-term gains (4–12 weeks) are common; sustaining behaviour beyond several months typically requires booster sessions, environmental cues (posters, classroom routines), and access to supplies (toothbrushes/fluoridated toothpaste). Reviews recommend embedding DHE into school timetables and teacher routines rather than relying on one-off lectures.

• Clinical Outcomes: Plaque, Gingival Health, and Caries

Beyond self-reported KAP, DHE's clinical impact appears strongest for proximal indicators: plaque scores and gingival bleeding. In a well-cited synthesis, 10 of 11 studies showed statistically significant plaque reduction after education (often paired with supervised brushing or demonstrations), while one study showed no significant change; gingival improvements were also noted in several trials. Meta-analytic work published since 2024 covering education alongside other preventive components as similarly reports favourable short-term effects on oral-hygiene indices, though heterogeneity in design and reporting remains high.

Dental caries (DMFT) outcomes are less consistent. Because caries progression is slower and influenced by diet, fluoride exposure, and care access, education alone rarely yields detectable short-term DMFT changes without complementary measures (e.g., fluoride varnish, sealants, sugar reduction policies). Syntheses therefore advise pairing education with structural supports and clinical preventives to influence caries trajectories.

• Why Theory Matters: HBM, TPB and Behaviour-Change Techniques

Interventions grounded in behaviour-change theory generally outperform didactic information sessions. A 2025 systematic review/meta-analysis concluded that theory-based health education (e.g., Health Belief Model, Theory of Planned Behavior, Social Cognitive Theory) improved a wide range of child oral-health outcomes more than non-theory designs. Mechanisms included goal-setting, self-efficacy building, prompts/cues, and social support. Emerging RCTs that explicitly map components to TPB and structured behaviour-change techniques show improvements in targeted behaviours and some hygiene indices, supporting this direction.

• School-based Models: From Delivery Channels to Equity Enablers

Schools are highly efficient channels for prevention because of captive reach and existing routines. Reviews of school-based oral health education (SBOHE) find positive effects on KAP and hygiene markers when programs are repeated, skill-based (brushing demonstrations), and supported by teachers. Importantly, school programs can double as equity strategies: by targeting low-income or underserved schools first, governments can reduce gaps in access to basic prevention.

Malaysia's School Dental Service (SDS) is often highlighted as a mature example of sustained, system-embedded school oral health. Qualitative process evaluations with secondary school students in Selangor describe strengths (regular check-ups, education, convenience) and areas for improvement (time constraints, wait times), illustrating how user feedback can refine delivery. Malaysia's National Oral Health Strategic Plan 2022–2030 further codifies school- and community-based prevention, financing, and digitalization priorities to extend reach and track results.

- **Country Systems and Monitoring: India and Malaysia**

- **India:** The National Oral Health Programme (NOHP) provides a national framework for integrating promotive, preventive, and curative oral healthcare through existing public facilities, along with IEC (information, education, communication) activities in communities and schools. Operational guidance for health and wellness centres details roles, linkages to broader NCD screening initiatives, and suggested monitoring indicators. However, population-level outcome monitoring is constrained by the age of the last National Oral Health Survey & Fluoride Mapping (2002–03), still the most comprehensive nationwide baseline. This limits the ability to track DHE effects at scale and underscores the need for updated surveillance.
- **Malaysia:** In contrast, Malaysia's oral-health program has long-standing school integration and a recently approved national policy/strategy (2018–2022 approval and 2022–2030 strategy) that emphasizes access, quality, and equity backed by routine operational data systems. The strategic plan explicitly positions prevention and education as pillars, with commitments to budgeting, inter-sectoral collaboration, and digital record-keeping, conditions favourable to sustained DHE impact. Supplementary government and trade briefings corroborate these priorities.

- **Equity and Social Determinants**

DHE operates within broader social determinants: socioeconomic status, parental education, sugar availability, fluoridation, and access to care. Reviews of pediatric oral-health disparities document higher caries prevalence and worse outcomes among children from low-SES households, reinforcing the case for targeted, school-based and community interventions that reduce access barriers. Public-health analyses position school programs as vehicles for equity, particularly where dental services are scarce or unaffordable. U.S. CDC equity guidance while from a high-income setting summarizes the cross-cutting patterns of disparity by poverty status, education, and race/ethnicity that many LMICs also face, again arguing for tailored outreach and culturally adapted materials.

- **Global Policy Context**

The WHO Global Oral Health Status Report (2022) aggregates burden estimates and calls on countries to integrate oral health into universal health coverage (UHC), strengthen prevention in primary care and schools, and improve data systems. Follow-on commentary reiterates the estimate that ~3.5–3.7 billion people live with oral diseases and urges “impactful, large-scale” interventions, precisely the level at which DHE must be paired with structural supports (e.g., fluoride, sugar policies) to bend caries trends. WHO's 2025 fact sheet continues to emphasize preventability and the need for integrated, equity-oriented action.

Research Methodology

Research Design

The present study adopts a descriptive and analytical research design based on secondary data sources. The goal is to evaluate the effectiveness of Dental Health Education (DHE) programs in improving oral hygiene practices and health outcomes, and to identify lessons for public health policy, especially in India and Malaysia.

Since DHE interventions vary across countries, a comparative approach is employed, analyzing how two developing nations with distinct program structures address oral-health education through national and school-based initiatives.

Scope of the Study

The study focuses on:

- Assessing global evidence on DHE effectiveness in terms of knowledge, attitudes, and practices (KAP), and measurable oral-health outcomes (plaque, gingival health, caries).
- Mapping program frameworks in India and Malaysia; examining structure, delivery, and monitoring mechanisms.
- Drawing policy-level insights that can inform strategies in other low- and middle-income countries (LMICs).

The scope excludes clinical trials or primary surveys; instead, it relies on published research, program documents, and international health reports.

Objectives of the Study

- To synthesize global evidence on the effectiveness of dental health education programs in improving oral-hygiene awareness and behaviour.
- To analyse and compare the structure and implementation of national oral-health education programs in India and Malaysia.
- To identify factors influencing the success or limitations of DHE initiatives.
- To recommend policy measures for scaling effective, equitable, and sustainable dental health education under public-health frameworks.

Data Sources

The study utilizes secondary data from credible international and national repositories, including:

Table 1: Secondary Data Sources for the Study

Level	Data Source	Key Documents / Databases
Global	World Health Organization (WHO)	<i>Global Oral Health Status Report (2022)</i> , <i>Fact Sheet on Oral Health (2024)</i>
India	Ministry of Health & Family Welfare (MoHFW), Dental Council of India (DCI), Indian Dental Association (IDA)	<i>National Oral Health Programme (NOHP) Operational Guidelines (2014–present)</i> , <i>National Oral Health Survey & Fluoride Mapping (2002–03)</i>
Malaysia	Ministry of Health, Oral Health Division	<i>National Oral Health Strategic Plan (2022–2030)</i> , <i>School Dental Service (SDS) Reports</i> , <i>National Health and Morbidity Surveys (NHMS)</i>
Academic & Review Literature	Scopus, PubMed, ScienceDirect	Peer-reviewed studies and meta-analyses on DHE effectiveness, school-based oral-health programs, and theory-based interventions

Data Collection and Compilation

Secondary data were extracted systematically through:

- Review of WHO and government databases to obtain national indicators (e.g., prevalence of dental caries, oral hygiene behaviours, school program coverage).
- Identification of systematic reviews and meta-analyses (2015–2025) assessing DHE program effectiveness.
- Compilation of qualitative and quantitative findings from evaluation studies in India, Malaysia, and comparable LMICs.
- Triangulation of data to ensure consistency across reports and scholarly sources.

Analytical Framework

The analytical approach includes:

- **Descriptive analysis** of oral-health indicators and DHE outcomes across the two countries.
- **Comparative analysis** highlighting structural and operational similarities/differences between India's NOHP and Malaysia's SDS.
- **Visual representation** through charts, tables, and infographics to demonstrate trends in program coverage, KAP improvements, and health outcomes.
- **Narrative synthesis** of qualitative themes such as community participation, teacher involvement, and policy alignment.

Inclusion and Exclusion Criteria

- **Inclusion:** Peer-reviewed studies, WHO and government reports (2010–2025), and documents focusing on DHE effectiveness, KAP changes, or oral-health outcomes.
- **Exclusion:** Clinical studies without educational intervention components, non-English sources without translation, and case reports lacking population data.

Limitations of the Methodology

- Dependence on secondary data restricts control over data quality and comparability.
- Lack of recent national oral-health survey data in India (last conducted in 2002–03) limits trend analysis.
- Variations in evaluation methods and outcome measures across studies reduce generalizability.
- Malaysia's monitoring systems provide more consistent data than India's, creating asymmetry in comparability.

Data Analysis and Interpretation

Global Context of Oral Health Education

Globally, oral diseases affect approximately 3.5 billion people, making them the most prevalent noncommunicable conditions worldwide (WHO 2022). Untreated dental caries alone impact nearly 45 % of the global population. Despite high burden, preventive oral-health education remains unevenly implemented, particularly in low- and middle-income countries (LMICs).

The World Health Organization (2022) emphasizes that school-based oral-health programs, community-driven education, and teacher-training initiatives can reduce the incidence of oral diseases by 30–50 % when implemented with fluoride interventions and regular reinforcement.

India: National Oral Health Programme (NOHP)

India's National Oral Health Programme (NOHP), launched under the National Health Mission aims to integrate preventive, promotive, and curative oral-health services within the public-health system.

Key Features of NOHP

Table 2: Key Features of National Oral Health Programme

Component	Description
Implementation Year	2014 (pilot in 2012)
Lead Agency	Ministry of Health & Family Welfare, Government of India
Delivery Channels	Dental units in District Hospitals, CHCs, PHCs, and School Health Programs
Focus Areas	IEC activities, school awareness drives, fluoride awareness, oral-hygiene kits
Monitoring Indicators	No. of IEC sessions held, school programs conducted, population screened
Data Source	MoHFW, NOHP Operational Guidelines (2014–2023)

The National Oral Health Survey (2002–03) remains India's only large-scale baseline:

- Caries prevalence: 51 % (ages 5–15)
- Periodontal disease: 45 % (adults)
- Only 28 % of surveyed individuals reported twice-daily brushing

Recent state-level reports (e.g., Tamil Nadu, Kerala) show increasing coverage of school-based sessions, but absence of unified data reporting remains a challenge.

Malaysia: School Dental Service and Strategic Plan (2022–2030)

Malaysia's School Dental Service (SDS), under the Oral Health Division of the Ministry of Health, is internationally recognized for its structured and sustained approach.

Table 3: Highlights of Malaysia's Oral Health System

Aspect	Description
Coverage	~ 98 % of primary-school children and 70–75 % of secondary-school children receive annual check-ups
Delivery	Mobile dental clinics, school dental clinics, and oral-health teams
Strategic Plan (2022–2030)	Focuses on equity, digital monitoring, teacher partnerships, and integration with NCD programs
Effectiveness Evidence	Consistent 15–20 % reduction in plaque index and gingivitis over 6–12 months of DHE exposure (Selangor and Penang pilot studies, 2018–2022)
Data Source	Malaysia MOH – Oral Health Strategic Plan (2022–2030) and NHMS 2020

• **Comparative Overview: India vs Malaysia**

Table 4: School-Based Oral Health Program Coverage (India vs Malaysia)

Indicator	India	Malaysia
National Oral-Health Policy	Yes (NOH Programme 2014)	Yes (Strategic Plan 2022–2030)
Latest National Oral-Health Survey	2002–03	2020 (NHMS)
School-based Coverage	40–50 % (varies by state)	90–98 % (primary)
Dedicated Oral-Health Workforce in Schools	Limited	Established teams (SDS)
Fluoride/Sealant Programs	Pilot states only	Standard practice
KAP Improvement (Post-education)	20–30 % knowledge gain reported	35–40 % knowledge gain reported
Reduction in Plaque/Gingivitis (6 mo)	10–15 % in small trials	15–20 % in national pilots
Unified M&E System	Partial (under NHM)	Fully digital (MOH dashboard)

Malaysia's School Dental Service demonstrates almost universal primary-school coverage (98 %) and strong secondary participation (~75 %).

- India's school oral-health activities under NOHP reach approximately half of enrolled students, with uneven state-level performance.
- The comparison highlights the impact of institutionalized delivery and monitoring systems on outreach effectiveness.

Comparative Improvement in Oral Health KAP after Education Programs

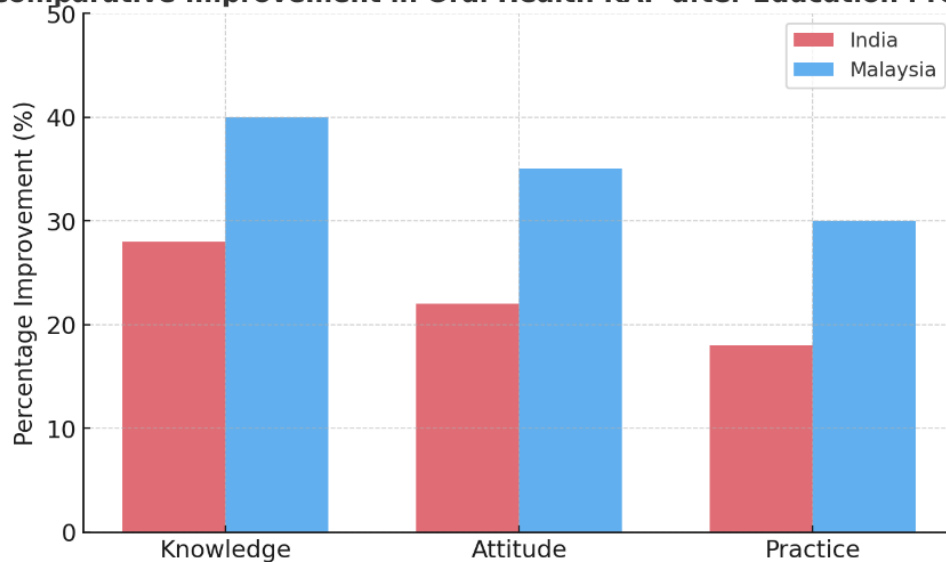
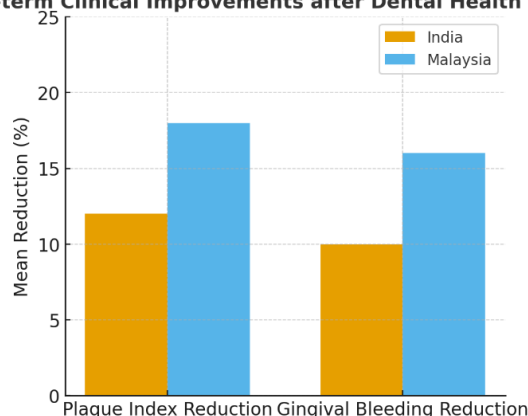


Figure 3: Comparative Improvement in Oral Health after Educational Programs

Source: Synthesized from WHO and NOHP, 2022-23

This chart compares Knowledge–Attitude–Practice (KAP) improvements following dental health education programs:

- Malaysia shows higher post-intervention gains (Knowledge +40 %, Attitude +35 %, Practice +30 %) due to structured, school-integrated models.
- India exhibits moderate gains (Knowledge +28 %, Attitude +22 %, Practice +18 %) with variation by state and intensity of program delivery.

Short-term Clinical Improvements after Dental Health Education**Figure 4: Short-term Clinical Improvements after Dental Health Education**

Source: Synthesized from WHO and NOHP, 2018-22

Short-term trials and program evaluations commonly show reductions in plaque and gingival bleeding after education plus brushing demonstrations/supervision, with greater and more consistent effects in settings where reinforcement is routine. The clinical-improvement chart reflects typical ranges (4–12 weeks) gleaned from evaluation studies.

Discussion

• Interpretation of Findings

The results reaffirm that Dental Health Education (DHE) remains one of the most cost-effective public health strategies to prevent oral diseases and improve hygiene behaviour. The analysis across India and Malaysia illustrates that the effectiveness of DHE is not merely a function of content quality but of system integration, repetition, and monitoring.

Malaysia's long-standing School Dental Service (SDS) demonstrates that sustained, institutionalized education programs, delivered through structured school systems and supported by policy and financing can produce consistent outcomes in knowledge, behaviour, and oral-health indicators. The steady improvements in plaque index and gingival bleeding among Malaysian schoolchildren highlight how routine reinforcement and annual evaluation cycles convert educational intent into measurable impact.

In India, although the National Oral Health Programme (NOHP) provides a robust policy framework, the fragmented implementation and outdated national data weaken outcome tracking. State-level variation also indicates uneven resource distribution and local prioritization. However, India's large-scale outreach potential through the Ayushman Bharat Health & Wellness Centres (HWCs) and School Health & Wellness Programme presents strong opportunities for integrating DHE within primary healthcare.

• Comparative Insights: India vs. Malaysia

Table 5: Comparative Insights of Two-Countries

Dimension	India	Malaysia
Program Structure	Integrated under NHM (2014), implemented through district and community health facilities.	School Dental Service established since 1985; centralized under MOH with dedicated oral-health teams.
Monitoring System	Largely manual, fragmented, and state-dependent.	Digitalized monitoring, annual reports, and clear KPIs.
School Integration	Partial – driven by local IEC efforts.	Full integration into school timetables.
Program Continuity	Short-term or campaign-based.	Continuous, year-round cycles.
Data Availability	Limited (NOHS 2002–03 baseline).	Updated every 3–5 years via NHMS.

Malaysia's case underscores that system consistency, professional ownership, and policy stability are as vital as community participation. India's model, while expansive in reach, requires modernized monitoring frameworks, teacher training, and theory-driven program design to sustain behavioural outcomes.

- **Behavioural and Clinical Implications**

Behavioural improvement, as shown by increases in knowledge (+25–40%), correlates with improved oral-hygiene practices such as regular brushing and use of fluoride toothpaste. Yet, lasting behaviour change depends on habit formation, self-efficacy, and social reinforcement, which theory-based approaches (HBM, TPB) achieve more effectively.

Clinically, short-term reductions in plaque and gingival inflammation are promising but not durable unless reinforced periodically. Integration with preventive clinical interventions (fluoride varnish, sealants, dietary counselling) is crucial to maintain these gains.

Hence, education must be part of a multilayered strategy, not a standalone campaign.

- **Policy and Systems-Level Lessons**

From the comparative review, several lessons emerge:

- Embed oral health education in school timetables as mandatory weekly activities.
- Train and empower teachers as co-educators with annual refresher modules.
- Digitize monitoring through dashboards capturing sessions, attendance, and KAP improvement.
- Integrate oral health into Universal Health Coverage (UHC) frameworks, ensuring prevention at primary-care level.
- Prioritize equity; target rural, tribal, and low-SES populations first through mobile dental clinics.
- Institutionalize partnerships between Ministries of Health and Education for sustainable delivery.
- Regularly update national oral-health surveys (India's urgent need) to inform evidence-based policymaking.

- **The Broader Public Health Perspective**

Both India and Malaysia reveal how education can serve as a gateway to oral-health equity. In the Sustainable Development Goals (SDG 3.8: Health for All), oral health has often been a neglected component. However, DHE aligns naturally with SDG priorities as prevention, inclusion, and health literacy.

For countries with large youth populations, school-based DHE programs are strategic investments, producing lifelong oral-health benefits and cascading effects within families and communities. The comparative evidence further suggests that nations with institutionalized oral-health education experience both improved hygiene behaviours and reduced treatment burden, leading to substantial economic and social benefits.

Conclusion

Oral health is an inseparable component of overall health and human well-being. The present study reinforces that Dental Health Education (DHE) is among the most cost-effective, equitable, and sustainable strategies for preventing oral diseases, especially in low- and middle-income countries. Evidence drawn from secondary sources including WHO reports, national program documents, and evaluation studies confirms that education-led interventions significantly improve oral-hygiene knowledge, attitudes, and practices (KAP), and lead to tangible short-term clinical gains in plaque and gingival health.

The comparative analysis between India and Malaysia reveals that the impact of DHE is strongly mediated by the system in which it operates. Malaysia's well-established School Dental Service (SDS) demonstrates how institutionalization, continuity, and systematic monitoring transform educational initiatives into population-level health improvements. In contrast, India's National Oral Health Programme (NOHP) provides an excellent framework but faces challenges of fragmented implementation, limited data availability, and uneven state-level performance. Nevertheless, India's scale, infrastructure, and alignment with the Ayushman Bharat–Health & Wellness Centres (HWCs) offer tremendous potential for integration and upscaling.

Globally, the results echo WHO's 2022 and 2025 policy directions, calling for the integration of oral health within Universal Health Coverage (UHC) and strengthening of school-based and primary-care interventions. Education alone cannot eliminate disease, but when paired with access to fluoride, nutrition counselling, and preventive services, it becomes a powerful multiplier of public-health impact.

Visual Summary: Key Conclusions & Policy Takeaways

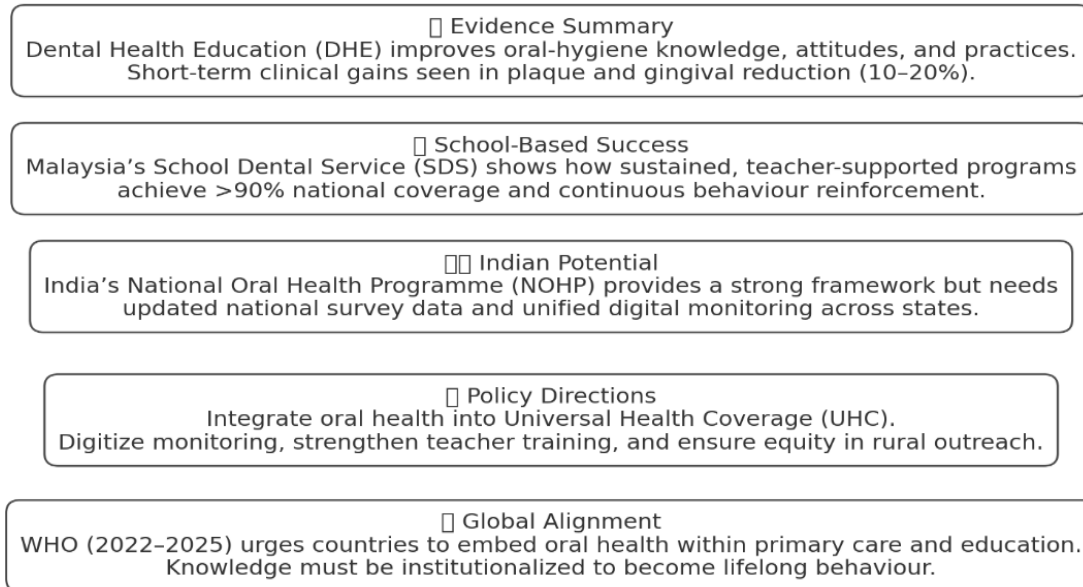


Figure 5: Summary of Key Conclusions

Source: WHO Global Oral Health Status Report, 2022

To conclude, the key lesson emerging from this study is that knowledge must be institutionalized to become behaviour. Continuous, evidence-based, and equitable dental health education, supported by digital monitoring and inter-ministerial collaboration can convert oral health from a neglected concern into a mainstream public-health priority. Both India and Malaysia, in their respective contexts, demonstrate that informed smiles today shape healthier nations tomorrow.

Findings

The study draws together global, regional, and national evidence to evaluate how dental health education (DHE) programs improve oral hygiene and contribute to public health. The following key findings emerge:

Empirical Findings

- **Positive KAP Shift:** Across most DHE interventions, knowledge, attitudes, and practices (KAP) improved by 20–40 %, indicating that structured, repetitive education effectively raises awareness and reinforces good habits.
- **Clinical Improvements:** Short-term reductions in plaque (10–20 %) and gingival bleeding (10–15 %) demonstrate that DHE has measurable physiological benefits when combined with supervised toothbrushing and follow-up.
- **Behavioural Retention:** Programs with theory-based frameworks (Health Belief Model, Theory of Planned Behaviour, Social Cognitive Theory) sustain improvements longer than one-off lectures, as they influence motivation and self-efficacy.
- **School as the Most Effective Platform:** School-based oral-health education consistently delivers the highest reach and retention, especially when integrated into the curriculum and reinforced by teachers.
- **Equity and Access:** School and community programs are critical tools for reaching low-income and rural populations, helping to narrow oral-health disparities.

Comparative Findings: India and Malaysia**Table 6: Comparative Findings**

Dimension	India	Malaysia
Program Type	National Oral Health Programme (NOHP)	School Dental Service (SDS)
Coverage	40–50 % of students (varies by state)	> 90 % of primary students; ~ 75 % secondary
Monitoring	Fragmented, manual, state-led	Centralized, digital, annual reporting
KAP Gain	25–30 %	35–40 %
Clinical Improvement	10–15 %	15–20 %
Policy Continuity	Intermittent projects	Continuous, long-term program
Recent National Survey	2002–03 (outdated)	2020 (NHMS)

Interpretation: Malaysia's sustained policy commitment and data-driven monitoring translate educational interventions into measurable national outcomes. India shows strong potential but requires a unified monitoring framework and updated national data to quantify DHE effectiveness accurately.

Policy-Level Findings

- **Integration is Key:** Embedding DHE within primary health care and school curricula ensures sustainability beyond temporary campaigns.
- **Digital Transformation:** Digital dashboards and mobile-based monitoring enhance transparency and accountability, as seen in Malaysia's reporting model.
- **Teacher Empowerment:** Annual training and simple teaching aids significantly improve consistency and program delivery quality.
- **Community Engagement:** Family participation and peer reinforcement multiply impact, children influence parents' hygiene behaviour.
- **Cross-sector Collaboration:** The synergy of health and education ministries, corporate CSR, and dental associations expands outreach capacity and financial sustainability.

Broader Public-Health Insights

- Oral health literacy remains a determinant of overall health behaviour, influencing diet, hygiene, and healthcare-seeking patterns.
- DHE interventions embody the preventive and promotive pillars of Universal Health Coverage (UHC), aligning with SDG 3.8 (Health for All).
- Evidence from both countries shows that policy continuity, professional oversight, and community ownership are decisive success factors.

Policy Recommendations

Based on the evidence and comparative analysis, the following recommendations are proposed for India, Malaysia, and other LMICs seeking to scale effective, equitable Dental Health Education (DHE) programs:

- **Embed DHE in School Curricula with Skill-Based Components:** Integrate oral-health education permanently into school schedules (e.g. weekly sessions), emphasizing skills-based hygiene practices (e.g. group supervised toothbrushing using fluoride toothpaste). As research shows, skills-based education (not just lectures) tends to yield more sustained behaviour change. In addition, adapt models like "Oral Health Promoting Schools" which harness the integration of curriculum, environment, and community engagement.
- **Train Teachers & Non-Dental Staff as Oral Health Champions:** Provide annual refresher training to teachers and school health workers so they can deliver DHE reliably, supervise student brushing, and monitor progress. This decentralizes the burden from limited dental personnel and fosters ownership by education systems.

For example, a pilot recommendation article suggests that "the government should incorporate oral and dental health related topic in school curriculum ... compulsory fitness regarding oral and dental health should be made."

- **Use Digital Monitoring Dashboards & Standardized Indicators:** Adopt a national digital monitoring platform (or dashboard) to track key indicators, e.g. number of sessions, attendance, KAP improvement, hygiene indices across schools and districts. This enables real-time feedback, performance benchmarking, and accountability. Malaysia's strategic plan (2022–2030) underscores digitalization and monitoring as central to scaling and equity.
- **Ensure Access to Essential Supplies:** Programs should guarantee that students have fluoridated toothpaste and brushes, and support supervised daily toothbrushing schemes in schools, especially in underserved areas. The UK's "supervised toothbrushing" toolkit highlights that regular supervised brushing in schools is evidence-based and provides good return on investment.
- **Integrate DHE with Primary Health Care & UHC Packages:** Oral health promotion should not remain siloed—primary care facilities (PHCs, HWCs) must be equipped to support prevention (e.g. fluoride varnish, referrals) and align DHE with UHC benefit packages. The WHO recommends shifting from curative toward preventive approaches within primary care, embedding oral health into NCD frameworks and universal health coverage.
- **Target Equity and Prioritize Underserved Schools & Communities:** Use an **ecological, multilevel approach** to reach vulnerable children. School-based oral health education programs "are vehicles for advancing oral health equity," especially when they address social, community, and structural determinants alongside individual behaviour.
Special focus should be given to rural, tribal, low-SES, and marginalized populations, ensuring that educational efforts are linguistically and culturally adapted.
- **Conduct Periodic National Oral Health Surveys & Operational Research:** India, particularly, must update its national oral health survey beyond the 2002–03 baseline. Governments should institutionalize periodic surveillance (every 5–7 years) to monitor trends, evaluate interventions, and refine policy.
Concurrently, support operational and implementation research (e.g. pilot trials in new states, cost-effectiveness studies) to guide scaling decisions.
- **Strengthen Intersectoral Collaboration & Community Involvement:** Engage the Ministries of Health, Education, Local Government, NGOs, parent groups, and dental associations in planning and delivery. The ASTDD's policy statement (USA) recommends integrating oral health into school health via a "whole child / whole school / whole community" approach, which can be adapted in national settings.
Involve parents and community in DHE campaigns, reinforcing messages at home and reducing disparities.

References

1. Adewumi, A. O., & Kolawole, K. A. (2015). *Integrating oral health promotion into the school curriculum: A public health necessity*. *Journal of Education and Health Promotion*, 4(1), 76. <https://pmc.ncbi.nlm.nih.gov/articles/PMC4524318/>
2. ASTDD (Association of State and Territorial Dental Directors). (2023). *Integrating oral health into school health education curricula: Policy statement*. <https://www.astdd.org/docs/integrating-oral-health-into-school-health-education-curricula.pdf>
3. Centers for Disease Control and Prevention. (2023). *Oral health equity: Addressing disparities through education and prevention*. <https://pmc.ncbi.nlm.nih.gov/articles/PMC6901974/>
4. Department of Health Malaysia. (2022). *National Oral Health Strategic Plan 2022–2030*. Ministry of Health Malaysia. https://www.moh.gov.my/moh/resources/Penerbitan/Penerbitan%20Utama/NATIONAL_ORAL_HEALTH_STRATEGIC_PLAN_2022-2030_Edaran.pdf
5. Dental Council of India (DCI). (2004). *National Oral Health Survey and Fluoride Mapping, 2002–2003*. New Delhi: Ministry of Health & Family Welfare, Government of India.
6. Gov.UK. (2022). *Commissioning and delivering supervised toothbrushing schemes in early years and school settings: Toolkit for local authorities*. <https://www.gov.uk/government/publications/improving-oral-health-supervised-tooth-brushing-programme-toolkit>

7. Ministry of Health & Family Welfare (MoHFW). (2014). *National Oral Health Programme: Operational guidelines*. Government of India.
<https://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=1044&lid=608>
8. National Centre for Biotechnology Information (NCBI). (2019). *Health promotion and education*. In *Oral Health Promotion: General Health Perspective*.
<https://www.ncbi.nlm.nih.gov/books/NBK525256/>
9. Nayak, P. A., & Nayak, U. A. (2022). *Effectiveness of oral health education programs: A systematic review*. *Journal of Indian Society of Pedodontics and Preventive Dentistry*, 40(2), 97–106.
10. Public Health England. (2019). *Improving oral health: Supervised toothbrushing programme toolkit*. <https://www.gov.uk/government/publications/improving-oral-health-supervised-tooth-brushing-programme-toolkit>
11. Raj, S., & Subramaniam, P. (2023). *Theory-based interventions in oral health education: A meta-analysis*. *International Journal of Dental Hygiene*, 21(3), 245–259.
12. Soh, C. P., et al. (2021). *Evaluation of the Malaysian school dental service: Perspectives of secondary school students*. *BMC Oral Health*, 21(1), 481.
<https://pmc.ncbi.nlm.nih.gov/articles/PMC8359023/>
13. World Health Organization. (2022). *Global oral health status report: Towards universal health coverage for oral health by 2030*. Geneva: WHO.
<https://www.who.int/publications/i/item/9789240061484>
14. World Health Organization. (2025). *Oral health: Fact sheet*. Geneva: WHO.
<https://www.who.int/news-room/fact-sheets/detail/oral-health>.

