HOPE-IN:

Holistic Oral Health Prioritisation & Equity through Integrating with National Health Programs of India

Dr. Sifpsa Diwakar
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Preface

India's healthcare landscape is vast and diverse, with the government launching numerous national health programs aimed at addressing the country's pressing healthcare challenges. Over the years, these programs have played a crucial role in improving public health outcomes. However, one area that has often been overlooked in national health strategies is the integration of oral health with general healthcare.

This Book seeks to explore the significance of incorporating oral health into India's national health programs. It highlights the potential of the National Oral Health Programme (NOHP) as a key initiative to bridge this gap and proposes a multidisciplinary approach to healthcare.

The goal of this Book is twofold: first, to shed light on existing national health programs and how they can be enhanced through the integration of oral health; and second, to emphasise the value of a multidisciplinary approach involving collaboration among healthcare providers across various specialties. By focusing on prevention, early diagnosis, and treatment of health conditions—including those related to oral health—the Indian healthcare system can become more cost-effective while delivering higher-quality care.

In doing so, this Book advocates for a shift in the healthcare paradigm, where oral health is no longer seen as a secondary concern but as a fundamental component of holistic well-being. The interdisciplinary collaboration proposed here is essential to achieving long-term health benefits for the Indian population, contributing not only to an improved quality of life but also to a more sustainable healthcare system.

Through a detailed analysis of existing health programs and their intersection with oral health, this Book aims to provide insights into how a more integrated healthcare model can be achieved. By ensuring that oral health is recognised as a foundational aspect of overall health, India can move toward a more comprehensive, efficient, and affordable healthcare system, benefiting millions across the country.

HOPE-IN: Holistic Oral health Prioritisation and Equity through Integrating with National Health Programs of India is dedicated to India's healthcare workforce—including frontline health workers, program coordinators, policymakers, and other key contributors—whose tireless commitment serves as the foundation of the nation's public health initiatives. Their dedication to strengthening healthcare systems and ensuring accessible, equitable services has played a pivotal role in improving the wellbeing of communities across India.

It is our hope that this work provides valuable insights into the integration of oral health within national health programs, supporting the development of a more comprehensive, inclusive, and sustainable healthcare system for the country.

Acknowledement

It is with profound respect and heartfelt gratitude that I acknowledge my guide, Dr. Sumit Kumar, Additional Professor, Department of Public Health Dentistry, Faculty of Dental Sciences, King George's Medical University. His constant inspiration, patient guidance, and invaluable wisdom have served as a compass throughout my academic and professional development, enabling me to overcome challenges with clarity and confidence.

I extend my deepest appreciation to my esteemed Professor and Head, Dr. Vinay Kumar Gupta, whose steadfast support, consistent encouragement, and insightful guidance have been instrumental in shaping this book. I am equally indebted to Dr. Gaurav Mishra, Additional Professor, for his expert advice and constructive inputs, which greatly enriched the quality of my work. I also thank Dr. Nishita Kankane, Assistant Professor, for her kind support.

I gratefully acknowledge the opportunity to share this experience with my co-postgraduates, Dr. Sreeja G and Dr. Aayushi Aggarwal, whose companionship and encouragement have been invaluable. I am also thankful to my seniors, Dr. Mohit Kumar Kanoujia, Dr. Aman Rajput, and Dr. Deepak S, for their wisdom and guidance, as well as to my juniors, Dr. Rinsi Noora, Dr. Aditya Agarwal, and Dr. Pallavi Mishra, for their consistent support and cooperation. A special word of thanks goes to my dear friend, Dr. Sonali Garg, for her constant support and encouragement, which served as a source of reassurance during moments of difficulty.

Above all, I owe my deepest gratitude to my beloved family—my parents and siblings—whose unconditional love, faith, and encouragement have been my strongest foundation. Their sacrifices and constant support have been the bedrock of my perseverance and strength.

Finally, with utmost humility, I bow in reverence to the Almighty, for blessing me with the courage, determination, and resilience to complete this work.

Dr. Sifpsa Diwakar

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CHAPTER

1

Introduction

Public health has been described as the science and art of preventing disease, prolonging life, and promoting health through organised community efforts. As articulated by Charles-Edward A. Winslow in 1920, this field encompasses various domains, including sanitation, communicable disease control, personal hygiene education, and medical services organisation. Over the decades, the definition has evolved to address the broader determinants of health, including environmental, social, and policy dimensions.[1]

Significant achievements in public health include reducing child mortality, controlling vaccine-preventable diseases, ensuring access to safe water and sanitation, combating malaria, mitigating HIV/AIDS, TB control, tobacco control; Global Road safety and Awareness, Improved preparedness and response to global health threats, increase in life expectancy; and decrease in substance abuse and addiction. Public health has also proven crucial in addressing pandemics such as COVID-19, by integrating global and local responses.[1]

In developed countries, the emphasis of public health has transitioned towards fostering healthy living and ensuring an extended lifespan with an improved quality of life. Consequently, substantial investments are being directed toward health promotion initiatives and sustainable development strategies. However, in developing nations, the primary focus remains on addressing the persistent challenges posed by communicable and non-communicable diseases.[1]

As public health professionals, it is essential to engage in continuous evaluation of both the successes and shortcomings of public health interventions. It is important to question whether public health interventions are always beneficial, as they may also have unintended negative consequences. These potential harms can be categorised into several types: direct harms, psychological harms, equity harms, social and group harms, and opportunity costs (Lorenc T, Oliver K, 2014).[2]

Many global health challenges are supported by influential institutions and recognised by key organisations. For example, the Task Force for Child Survival and Development has, for decades, coordinated international efforts to ensure political

focus on child health (Task Force for Child Survival and Development, 2009). Similarly, the Global Polio Eradication Initiative, a collaborative effort involving the World Health Organization, Rotary International, the Centres for Disease Control and Prevention, and UNICEF, leads the worldwide campaign to eradicate polio (Global Polio Eradication Initiative, 2009). The global response to HIV/AIDS is underpinned by a robust framework, including its dedicated United Nations agency, UNAIDS, and the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), which has been described as the largest international health initiative by any nation dedicated to a single disease (US President's Emergency Plan for AIDS Relief, 2009).[1]

These powerful institutions and organisations possess the ability to highlight and address health issues on various platforms, ensuring their continued sustainability. However, some critical health conditions, such as malnutrition, cardiovascular diseases, diabetes, and pneumonia, have not garnered sufficient attention from these global entities, resulting in limited political prioritisation (Morris, 2008; UNICEF and WHO, 2006). Public health challenges extend beyond scientific evidence, and public health professionals must recognise the multifactorial factors that influence the framing of issues as significant public health concerns.[1]

Addressing public health priorities for oral diseases has proven to be an enormous challenge. A key statement from the inaugural WHO Global Oral Health Status Report highlights the consequences of prolonged political and global health neglect, stating that "the status of global oral health is alarming and requires urgent action." Despite being largely preventable, oral diseases currently affect an unprecedented 3.5 billion people worldwide—a number exceeding the combined global burden of all other non-communicable diseases (NCDs).[3]

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CHAPTER

2

Public Health in India: Historical Progress, Contemporary Challenges, and Health Indicators

Historical Progress

Indigenous Foundations of Public Health in Ancient India

India's public health traditions can be traced back to the Indus Valley Civilisation (around 2500 BCE), which demonstrated advanced urban planning, drainage systems, and sanitation. These archaeological findings suggest an early societal commitment to hygiene and environmental health. Ancient Indian medical systems such as Ayurveda, Siddha, and Unani emphasised personal hygiene, dietary regulation, and preventive care. Classical texts like the Charaka Samhita and Sushruta Samhita highlighted the role of physicians not only in curing illness but also in educating the community about health. Health was considered a product of equilibrium between body, mind, and environment, thus embedding public health within a broader ethical and spiritual context.[4]

Early State Involvement in Health during Pre-Colonial Period

In ancient and medieval India, the state played a visible role in health promotion. The Mauryan Empire, particularly under Emperor Ashoka, saw the establishment of hospitals for both humans and animals. Public health features such as wells, rest houses, and sanitation facilities were promoted as part of welfare policies. The Arthashastra mentioned health inspectors, food safety regulation, and sanitation codes. In the Mughal period, although medical care remained largely the domain of Unani practitioners and local healers, the rulers supported charitable hospitals and promoted health through infrastructure like sarais and baolis. These efforts, though decentralised and variable, marked significant contributions to public health in pre-colonial India.[4]

Colonial Public Health: Sanitation and Disease Control

British colonial rule transformed India's public health system through the introduction of Western medical practices and public health legislation, often in response to outbreaks of infectious diseases such as cholera, plague, and smallpox. The British established Sanitary Commissioners in the presidencies and began focusing on urban sanitation, particularly in areas of military and economic importance.

Policies such as the Vaccination Act of 1880 and Epidemic Diseases Act of 1897 were introduced. However, the public health approach was primarily designed to protect British troops and administrative infrastructure, with minimal attention to the rural Indian population.[5]

Legislative and Institutional Developments under British Rule

The colonial era saw the creation of various public health institutions and frameworks. The Indian Medical Service (IMS) was established to manage medical care for British officials and soldiers. Simultaneously, municipal boards and public health departments were tasked with urban sanitation, drainage, and water supply. Public health nursing and disease surveillance mechanisms began to emerge. The Indian Factories Act of 1881 laid the groundwork for occupational health by addressing working conditions in industrial sectors. However, these developments remained fragmented and served specific administrative interests rather than forming a comprehensive national strategy.[5]

Nationalist Critique and the Bhore Committee Report

By the early 20th century, Indian nationalists increasingly criticised the colonial public health apparatus for its elitism and exclusion of indigenous systems. Leaders like Mahatma Gandhi advocated sanitation, local self-reliance, and community participation in health. These discourses laid the foundation for the Bhore Committee Report (1946), which became a cornerstone of independent India's health planning. The committee recommended a comprehensive, state-sponsored national health service emphasising universal access, preventive care, and the integration of medical education with community service. The Bhore Committee vision profoundly influenced the post-independence restructuring of India's health system.[6]

Post-Independence Expansion of Public Health Programs

Following independence in 1947, India adopted a health system that sought to unify preventive, promotive, and curative services. The government established Primary Health Centres (PHCs) across rural areas and launched vertical programs targeting specific diseases, such as malaria, leprosy, tuberculosis, and family planning. These programs marked the beginning of structured national interventions to control major public health burdens. Despite infrastructural limitations, these efforts symbolised a significant transition from colonial elitism to a people-centric health framework, focused on equity and rural outreach.[6]

Transition to Decentralised Public Health Planning

By the late 20th century, Indian public health policies began to emphasise community-based planning, health education, and multi-sectoral coordination. Public health was increasingly viewed as a component of socio-economic development, requiring integrated efforts across departments and levels of governance. Decentralised planning,

participation of local institutions, and culturally sensitive health delivery models were progressively encouraged. Though challenges persisted, this period marked the institutionalisation of development-oriented public health thinking shaped by India's post-colonial realities.[6]

The growth of public health in India has been intrinsically linked to the evolution of its education system. During colonial times, training in public health was embedded in medical colleges to prepare military and administrative personnel. Key milestones included the founding of Calcutta Medical College (1835), School of Tropical Medicine (1922), and the All India Institute of Hygiene and Public Health (1932) — the oldest such institution in Southeast Asia.

Post-independence, several committees including the Bhore (1946), Mudaliar (1959), and Shrivastava (1975) Committees emphasised community-based, preventive health training. The ROME Scheme (1977) furthered these goals by promoting rural health exposure among medical students. National organisations such as the Indian Public Health Association (1956) and Indian Association of Preventive and Social Medicine (1974) provided institutional support.

In the 2000s, public health education expanded to include non-medical disciplines, leading to the creation of institutions like the Public Health Foundation of India (2006) and Indian Institutes of Public Health. This signalled a broader, interdisciplinary approach to workforce development and capacity-building in public health.[7]

Table 2.1

Era	Key Developments
Ancient India (~2500 BCE)	Urban sanitation in Indus Valley; holistic health in Charaka and Sushruta Samhita (Kumar, 2011).
Pre-colonial (Maurya–Mughal)	Hospitals under Ashoka; sanitation laws via Arthashastra; charity-supported health infrastructure (Kumar, 2011).
Colonial Era	Military-village-sanitation focus; acts like Vaccination (1880) and Epidemic Diseases (1897) (Mushtaq, 2009).
Institutional Structures	IMS setup; municipal boards; occupational health laws like Factories Act (1881) (Mushtaq, 2009; Kumar, 2011).
Nationalist Reform (1946)	Bhore Committee recommending preventive, universal health system (Kumar, 2011).
Post-1947 Expansion	PHCs and vertical disease-control programs; inclusion of family planning (Kumar, 2011).
Decentralised Health Planning	Growth of local governance, ASHA model, community health committees (Kumar, 2011).

Era	Key Developments
Public Health Education	Calcutta Medical College (1835); School of Tropical Medicine (1922); AIIHPH (1932) and later, PHA establishment; expansion into nonmedical disciplines (Negandhi et al., 2012).

Emerging evidence from oral health history enriches the narrative of India's public health journey, revealing its deep prehistoric foundations while underscoring inequities that persist in the present era.

Archaeological discoveries from Mehrgarh in the Indus Valley region provide some of the earliest evidence of dental intervention, dating back nearly 7,500–9,000 years. Analysis of human remains revealed drilled molar crowns that had been treated in vivo using flint-tipped bow drills, a technique originally employed for bead making. The cavities were small, conical or cylindrical in shape, and their marginal smoothing confirmed that these procedures were performed on living individuals. While the exact motive remains uncertain, the presence of caries in some specimens suggests therapeutic or palliative intent. This tradition of proto-dentistry is significant as it highlights that dental manipulation was practiced systematically in prehistoric South Asia, persisting for about 1,500 years before eventually disappearing. Such evidence positions the subcontinent among the earliest centers of organised dental care and underscores the deep cultural roots of health practices in the region.[8]

In contrast, modern India has witnessed an exponential rise in dental education and workforce production since the establishment of the first dental college in 1920 by Dr. Rafiuddin Ahmed. From only three colleges at the time of independence, the number expanded to over 300 by 2014, with the vast majority in the private sector. This rapid growth led to an improvement in the national dentist-to-population ratio from 1:301,000 in the 1960s to approximately 1:9,992 by 2014. However, severe inequalities persist, with urban centers enjoying far higher dentist availability compared to rural areas, where ratios often exceed 1:30,000. The uneven geographic distribution of dental colleges, concentrated in certain states while entirely absent in others, has further compounded access gaps. Despite producing more dental graduates annually than the United States, Brazil, or Europe, systemic weaknesses such as inadequate government absorption and excessive privatization continue to hinder equitable oral health coverage. Policy analyses have emphasised that integrating dentists into primary healthcare facilities could help bridge these rural–urban divides and strengthen the public health system.[9]

Contemporary Challenges

While advancements have been made, public health services are confronted with a number of challenges:

1. Poverty and Inequity: These factors significantly impact health outcomes, as seen in the uneven distribution of healthcare resources.
2. Epidemiological Transition: Shifts in disease patterns from infectious to chronic degenerative diseases necessitate a reorientation of public health strategies.
3. Climate Change: Global warming and its associated impacts on vector-borne diseases and human health require urgent attention. Rapid Population Growth: Overpopulation in developing countries, including India, places immense stress on existing healthcare infrastructure.[1]

India's public health system is confronted with multiple, overlapping challenges that reflect both structural limitations and evolving epidemiological patterns. A synthesis of recent literature identifies five key domains of concern: the triple burden of disease, health system fragmentation, inadequacies in workforce and cadre development, poor integration of evidence-based healthcare, and lack of centralised governance. This chapter draws exclusively from five peer-reviewed articles to delineate these challenges, without introducing external interpretations.[10–14]

Triple Burden of Disease

India continues to grapple with a persistent dual burden of communicable and Noncommunicable Diseases (NCDs), with the addition of nutritional and maternal-child health issues forming a triple burden. As outlined by Narain (2016)[11], the country faces high morbidity and mortality from infectious diseases such as tuberculosis, alongside increasing prevalence of NCDs including diabetes, cardiovascular diseases, and cancers. He notes that the transition has occurred without a commensurate improvement in infrastructure, surveillance, and access to care.

Additionally, Chauhan (2011)[10] emphasises that vector-borne diseases such as malaria and dengue continue to pose serious threats, particularly in areas with weak sanitation and housing.

A more recent reflection is provided by Deshmukh and Mistry (2025)[14], who cite WHO data showing that NCDs account for 63% of all deaths in India, with cardiovascular diseases alone contributing to over 27% of total mortality. Infectious diseases like tuberculosis remain endemic, with India having the highest global burden. The authors further highlight the significant yet often overlooked burden of oral diseases, noting that over 50% of individuals above age 5 suffer from untreated caries, and nearly 9% of adults over age 20 are edentulous.

Fragmented Governance and Crisis Response

Health governance in India remains fragmented across various departments and administrative levels. Chauhan (2011)[10] identified that intersectoral coordination

between different health-related agencies is often poor, leading to duplication of efforts and inefficiencies.

Similarly, Narain (2016)[11] underscores that India's health policies have suffered from inadequate implementation due to a lack of integrated leadership.

Deshmukh and Mistry (2025)[14] reinforce this perspective through their analysis of India's response to the COVID-19 pandemic. They describe how the absence of a centralised public health service resulted in delayed decision-making, inconsistent protocols, and competition for resources between states. They argue that these outcomes reflect systemic governance gaps and advocate for the establishment of a dedicated Indian Public Health Service (IPHS), modelled on the IAS and IPS frameworks, to improve coordination and accountability.

Gaps in Public Health Workforce and Cadre Formation

The absence of a robust, trained public health workforce is another major challenge. Priyadarshi et al., (2023)[12], through a situational analysis across four Indian states, reveal the inconsistent implementation of the Public Health Management Cadre (PHMC). Their findings indicate that states vary widely in organisational models, recruitment processes, and clarity of roles.

Stakeholders highlighted the lack of career incentives, delays in notifications, and overlapping responsibilities with existing administrative structures. The authors also emphasise that unless the cadre is developed with dedicated training pathways, transparent governance, and clear inter-departmental coordination, its effectiveness will remain limited.

This aligns with Deshmukh and Mistry's (2025)[14] argument that India requires a specialised cadre trained in epidemiology, public health law, and management to improve health system resilience.

Evidence-based healthcare, despite its global acceptance, remains poorly integrated into India's health system. Singh and Bharti (2024)[13] argue that most healthcare professionals lack formal training in EBM. They note that research literacy among Indian clinicians is low and that few institutions include EBM in their curriculum.

Moreover, there exists limited infrastructure for the systematic collection and use of high-quality local data to inform clinical or public health decisions. The authors emphasise that without embedding EBM within education, service delivery, and policy-making, the quality of healthcare will remain variable and inconsistent.

The article also notes the lack of funding and institutional support for health services research, further weakening the evidence-policy-practice link.

Need for Centralised Public Health Service

Several articles converge on the need for structural reform in India's public health governance. Deshmukh and Mistry (2025)[14] strongly advocate for the creation of an Indian Public Health Service. They argue that such a service would streamline communication, reduce bureaucratic delays, and enhance preparedness during public health emergencies.

The model proposed draws inspiration from global counterparts such as the U.S. Public Health Service and the UK's National Health Service. Additionally, the authors highlight the potential role of public health dentists within this framework, particularly in addressing oral health disparities, leading preventive programs, and contributing to field-based epidemiological research. They emphasise that oral health, often neglected, must be integrated into national public health strategies to improve overall population health outcomes.

Deshmukh and Mistry (2025) further emphasise the untapped potential of public health dentists, noting that their expertise in preventive care and community engagement positions them as key contributors to field-based epidemiological surveillance and programmatic leadership. By integrating dental professionals into broader public health cadres, India can strengthen disease monitoring, expand preventive outreach, and address the oral health gap that has long been neglected within national health priorities.

The challenges facing public health in India are deeply entrenched and multifaceted, spanning disease burden, system fragmentation, human resource limitations, and knowledge translation gaps. The reviewed literature consistently underscores the urgency of structural reforms, particularly the establishment of a centralised, trained public health workforce and leadership. Without strategic interventions grounded in evidence and supported by robust governance, India's public health system will continue to struggle with both acute crises and long-term health inequities.

Health Indicators

Health indicators, including mortality rates, DALYs, and nutritional status, provide insights into the population's health. For example:

1. Mortality indicators: Death rates, life expectancy, and infant mortality rates are essential for assessing health outcomes across demographic regions.
2. Morbidity indicators: Incidence and prevalence rates highlight the burden of communicable and non-communicable diseases.
3. Disability rates: DALYs measure the combined burden of premature mortality and disability, offering a comprehensive perspective.

4. Nutritional indicators: Metrics like low birth weight and Body Mass Index (BMI) indicate population nutrition levels.
5. Healthcare delivery indicators: Ratios such as doctor-to-population and immunisation coverage reflect healthcare system efficacy.4 (Roy et al., "Health Indicators and Socioeconomic Determinants" (2021).

Table 2.2: Key findings on health indicators and national health trends (1951–2023).

Health Indicator/ National Trends	Data	Reference
Life Expectancy (1951 vs 2023)	31.7 years (1951) to 70.7 years (2023)	Registrar General of India, Census Data (2023)
Infant Mortality Rate (1951 vs 2023)	134 per 1000 live births (1951) to 24 per 1000 live births (2023)	Registrar General of India, SRS (2023)
Crude Birth Rate (1951 vs 2023)	39.9 per 1000 (1951) to 16.9 per 1000 (2023)	Registrar General of India, SRS (2023)
Crude Death Rate (1951 vs 2023)	27.4 per 1000 (1951) to 7.4 per 1000 (2023)	Registrar General of India, SRS (2023)
DALYs: Communicable Disease Burden (1990 vs 2016)	34% of burden (1990) to 15% (2016)	Palanivel et al., IJRM (2013)
DALYs: Non-communicable Disease Burden (1990 vs 2016)	55% of burden (1990) to 73% (2016)	Palanivel et al., IJRM (2013)
Population Growth (1951 vs 2023)	361 million (1951) to 1.4 billion (2023	Registrar General of India, Census Data (2023)
Effective Literacy Rate (1951 vs 2023)	18.33% (1951) to 76% (2023)	NFHS-5, Census Data (2023)
Poverty Rate (1951 vs 2023)	54.9% below poverty line (1951) to 15% (2023)	NFHS-5, Census Data (2023
Health Expenditure as % of GDP (1950 vs 2023)	0.22% of GDP (1950) to 2.1% of GDP (2023)	World Health Report (2023)

India's health system has implemented numerous programs to address communicable diseases, maternal and child health, and nutritional deficiencies. However, a shift toward non-communicable disease prevention and control is becoming evident, oral health initiatives remain underdeveloped. The National Oral Health Program (NOHP), while a step forward, requires greater integration with other

national health missions, such as the National Health Mission (NHM) and Ayushman Bharat.1 Key recommendations include:

1. Enhanced funding: increasing budgetary allocations for oral health.
2. Public awareness campaigns: Promoting oral health literacy among vulnerable populations.
3. Capacity building: Training healthcare professionals to deliver integrated oral health services.

Building upon the identified challenges confronting India's public health system, it becomes imperative to examine the current health indicators that reflect the nation's epidemiological profile. These indicators provide measurable evidence of population health status, service delivery gaps, and emerging health threats. By analysing key data from recent national surveys and peer-reviewed studies, this chapter aims to present a focused overview of India's health trends, highlighting progress, disparities, and areas requiring immediate policy attention.

Recent national surveys and epidemiological studies offer a detailed view of India's health transitions, highlighting achievements in child and maternal health, alongside emerging challenges like non-communicable diseases, obesity, and healthcare access inequities.

Nutritional and Anaemia Indicators

The prevalence of malnutrition and anaemia continues to be a major public health concern in India. According to NFHS-5, 36% of children under five years were stunted, and 32% were underweight, indicating persistent undernutrition. Anemia has also worsened since NFHS-4, with 67.1% of children aged 6–59 months, 57.2% of women aged 15–49 years, and 31.1% of men found to be anaemic. The rising prevalence in all demographic categories suggests limited success in controlling micronutrient deficiencies despite ongoing interventions.[15]

Obesity and Overweight Trends

India is experiencing a growing epidemic of overweight and obesity. NFHS-5 reported that 24% of women and 22.9% of men aged 15–49 years were overweight or obese, up from 20.6% and 18.4% respectively in NFHS-4. Urban–rural disparity is evident, with urban obesity prevalence at 33.2% compared to 18.4% in rural areas. These rising trends are attributed to increasing sedentary lifestyles, unhealthy dietary patterns, and urbanisation, which are contributing to a higher burden of non-communicable diseases.[16]

Non-Communicable Disease Burden

The double burden of malnutrition and non-communicable diseases is becoming increasingly prominent. NFHS-5 findings highlight a substantial increase in diabetes

and hypertension prevalence. Among women aged 15 and above, 13.5% had high blood sugar, and 21% had elevated blood pressure. Among men, these figures were 15.6% and 24%, respectively. Notably, 43% of those with diabetes also had co-existing hypertension, illustrating a concerning trend of NCD multimorbidity.[15]

Mental Health Workforce Gaps

Despite the rising mental health burden, India continues to suffer from an acute shortage of trained professionals. The country has only 0.75 psychiatrists per 100,000 population, far below the WHO recommendation of 1.7 per 100,000. This shortfall is further exacerbated by inadequate numbers of clinical psychologists, psychiatric nurses, and social workers. The current infrastructure remains insufficient to meet the growing demand for mental health services, highlighting a critical gap in public health delivery.[17]

Out-of-Pocket Expenditure and Financial Risk

Health financing in India is still characterized by a high Out-Of-Pocket (OOP) burden. As per analysis of NSS 75th round data, approximately 48.8% of total health expenditure is borne directly by households. Moreover, 20.1% of Indian households incurred Catastrophic Health Expenditure (CHE), defined as healthcare costs exceeding 10% of household consumption. The financial burden is significantly higher among rural and socioeconomically disadvantaged populations, emphasising the need to improve public sector capacity and financial protection mechanisms.[17]

Environmental Risks: Air Pollution and NCDs

Emerging evidence highlights a strong association between long-term air pollution exposure and metabolic disorders. A study conducted across Delhi and Chennai revealed that a 10 $\mu g/m^3$ increase in PM 2.5 exposure was linked with a 22% higher risk of developing type 2 diabetes. This association is believed to be mediated by systemic inflammation and oxidative stress, indicating the urgent need to integrate environmental health into chronic disease prevention strategies.[18]

Disruption of Routine Services During COVID-19

The COVID-19 pandemic significantly disrupted routine healthcare services in India. Data from Rajasthan showed an 83.1% decline in childhood immunisations during April–June 2020, with one-third of children missing scheduled vaccines. Such disruptions not only reverse public health gains but also underline the fragility of healthcare systems during public health emergencies.[19]

Inter-State Disparities: India Health Index

To address fragmented health assessments, a composite India Health Index was developed using NFHS-5 and related data. This index encompasses six domains—health

status, risk factors, household environment, health services utilisation, preventive care, and policy effectiveness. Principal component analysis revealed significant spatial variation, with Kerala, Himachal Pradesh, and Tamil Nadu ranking highest, while Bihar, Uttar Pradesh, and Jharkhand performed poorly. Such benchmarking tools are critical for targeted policy action and resource allocation.[20]

India's health indicators reflect a complex and evolving public health landscape. While notable progress has been made in reducing undernutrition and improving life expectancy, the rising burden of NCDs, obesity, mental health issues, and financial barriers to care pose significant challenges. Air pollution and service disruptions during emergencies further compound these issues. Emerging tools like the India Health Index offer valuable frameworks for prioritising interventions and addressing inter-state disparities. Strengthening primary healthcare, increasing health workforce capacity, and integrating environmental and mental health into mainstream policies remain critical priorities.

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CHAPTER

3

Dental Public Health in India

The foundations of dental public health in India are deeply rooted in ancient practices. Archaeological discoveries from Mehrgarh (7000 BCE) indicate the use of early dental tools for drilling teeth. Traditional systems like Ayurveda and Unani documented herbal treatments for oral ailments and promoted routine oral hygiene using natural remedies like chewing sticks, reflecting a preventive orientation toward oral care that predated modern dentistry.[21]

The formal introduction of dentistry during the colonial period was slow and urban-centric. Dental care remained largely unregulated and informal, often provided by barbers or quacks. In 1920, the first dental college was established in Calcutta, signalling the beginning of organised dental education in India. Concurrently, general public health reforms took shape, such as the Quarantine Act of 1825 and the involvement of the Rockefeller Foundation in the 1920s, which emphasised preventive healthcare delivery. These efforts indirectly laid the structural framework for the eventual inclusion of oral health within the broader public health system.[22]

The passing of the Dentist Act in 1948 established the Dental Council of India (DCI), responsible for regulating dental education and practice nationwide. The National Health Policy of 1983 further prioritised decentralization and prevention, catalysing the alignment of oral health goals with national healthcare priorities.[7]

The academic formalisation of dental public health occurred in the late 20th century. In 1969, the first Department of Preventive and Social Dentistry was set up at Government Dental College, Bengaluru, by Prof. Mohandas Bhat. India introduced its first postgraduate program (MDS) in this discipline by 1972. Subsequently, in 1983, the DCI made public health dentistry a compulsory subject in the BDS curriculum. The founding of the Indian Association of Public Health Dentistry (IAPHD) in 1993 further strengthened the academic identity of the specialty and fostered research, policy discussions, and training.[23]

Public health dentistry's growth was shaped by parallel reforms in health education. The establishment of the All-India Institute of Hygiene and Public Health (AIIHPH) in 1932 marked a milestone in structured public health training. Reforms

proposed by the Mudaliar and Shrivastava Committees led to the Reorientation of Medical Education (ROME) scheme in 1977, promoting hands-on community training in health curricula—an approach that positively influenced dental public health education as well.[7]

Despite institutional advancements, significant gaps remain in service delivery. While India has over 300 dental colleges, only a small proportion of postgraduate seats are in public health dentistry. Many departments operate solely to fulfil regulatory OPD requirements rather than engage in meaningful community service. Rural areas continue to face a lack of dental personnel, and the goal of having a public health dentist at each Community Health Centre is still unmet due to systemic limitations.[24]

A significant policy milestone was the National Oral Health Survey (2002–03), conducted by the DCI, which offered the first national-level epidemiological data on oral disease prevalence. This was followed by the launch of the National Oral Health Programme to strengthen preventive and promotive services. However, integration of oral health into broader initiatives like Ayushman Bharat remains limited due to lack of dedicated funding, unclear operational protocols, and weak monitoring mechanisms.[25]

There is now growing emphasis on redefining public health dentistry competencies to meet the demands of contemporary healthcare. This includes integrating leadership, advocacy, and policy-making skills along with the application of modern technologies such as artificial intelligence, GIS mapping, and big data analytics to guide targeted interventions. These efforts reflect a shift from traditional clinical roles to a more holistic, system-level approach to oral health.[23]

In summary, the evolution of dental public health in India has spanned from ancient practices and colonial limitations to structured education, professional regulation, and national-level policies. While academic and institutional frameworks have matured, challenges in implementation, workforce deployment, and integration with public health systems continue to hinder equitable access to oral healthcare. Bridging these gaps remains essential to realizing the full potential of public health dentistry in India.[26]

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CHAPTER

4

Public Health Planning: The Indian Context

Public health in India dates back to the Indus Valley Civilisation, with early evidence of sanitation systems and public health measures. The Great Ashoka period marked the establishment of hospitals and emphasis on human, animal, and environmental health. Over time, invasions and conflicts led to a decline in health systems, but British rule reintroduced structured health policies, including hospitals and medical education.[1]

Table 4.1: Key Health Committees in India, Their Recommendations, and Year-Wise Summary.[1]

Year	Committee Name	Key Features
1943–1946	Bhore Committee	Proposed a comprehensive primary healthcare system; suggested one PHC per 10,000–20,000 people; recommended focus on preventive health and equitable resource allocation; emphasised community involvement in health services.
1948	Chopra Committee	Recommended integration of indigenous and modern medicine systems; emphasised multidisciplinary research to improve healthcare delivery.
1949	Dasgupta Committee	Focused on housing, water supply, sanitation, and vector control; proposed improvements in drainage and waste disposal systems.
1954	Shetty Committee	Recommended a minimum nurse-to-patient ratio of 1:3 in teaching hospitals and 1:5 in general hospitals; suggested introducing senior nurse roles for better management.
1957	Balwant Rai Mehta Committee	Evaluated the community development program; proposed the establishment of a three-tier Panchayati Raj system (village, block, district levels) to decentralise health and development planning.
1960	Renuka Roy Committee	Recommended school health initiatives, including preventive care, health education, and provision of school meals; proposed integration of school health services with primary healthcare networks.

Year	Committee Name	Key Features
1962	Mudaliar Committee	Evaluated progress of health services under five-year plans; suggested strengthening PHCs and district hospitals; proposed mobile healthcare teams for rural areas; recommended small fees for hospital services, excluding the poor.
1963	Chadha Committee	Focused on integrating malaria maintenance activities with general health services; proposed the development of multipurpose domiciliary health services for communicable diseases, health education, and surveillance.
1966	Mukherjee Committee	Recommended administrative strengthening at all levels; proposed delinking malaria control activities from family planning programs to ensure dedicated focus.
1966	Jain Committee	Suggested setting up outpatient beds and emergency services; proposed charging minimal fees for hospital services and prioritising hospitals in underdeveloped areas.
1967	Jungalwalla Committee	Emphasised integration of health services under a unified administrator; proposed common seniority for health staff, equal pay for equal work, and improved service conditions for government doctors.
1972	Kartar Singh Committee	Advocated the use of multipurpose workers for health, family planning, and nutrition services in rural areas; suggested one male health worker per 6,000–7,000 population and one female worker per 10,000–12,000 population.
1974-1975	Shrivastava Committee	Proposed integrating basic health services within communities; recommended linking PHCs to referral centers; suggested creating a National Referral Service for better health outcomes.
1977	Siddhu Committee	Reviewed hospitals in Delhi; recommended establishing accident and emergency departments; emphasised the need to strengthen medical, nursing, and paramedical staff and hospital administration.
1982	Krishnan Committee	Focused on primary urban health services for slum dwellers; proposed ensuring availability of basic health services within 1–3 km of dwellings and linking them to secondary and tertiary care facilities.
1986	Bajaj Committee	Advocated for a National Policy on education in health sciences; recommended realistic health manpower surveys; proposed establishing health science universities and training teachers in health education and technology.

Strategic Approaches and Implementation in Health Planning

While the steps involved in health planning are similar to general planning processes, historically, decision-making in India has predominantly followed a centralised "top-down approach." In this model, the central government has taken primary responsibility for planning, with limited participation from local authorities, such as village panchayats or small administrative blocks.

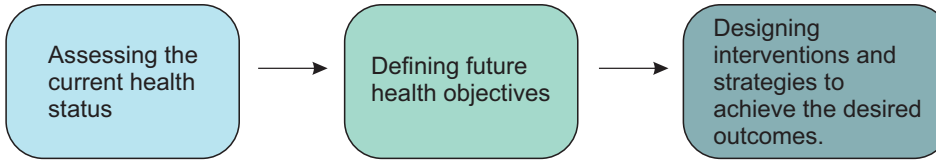

Fig. 4.1

Recognising the limitations of this method, there has been a growing shift toward a "bottom-up approach" or decentralised planning. Decentralisation involves systematically delegating decision-making authority across all levels of the organisation. By transferring executive powers to local entities, such as Panchayats and Primary Health Centres (PHCs), planning and management become more context-specific and responsive to local needs.

This bottom-up approach prioritises decision-making at the lowest feasible managerial level, fostering a more democratic, practical, and community-driven planning process. Despite increasing emphasis on decentralisation, many health planning activities continue to follow the top-down model, which can limit the effectiveness and adaptability of interventions. Transitioning fully to decentralised planning remains an essential focus for achieving equitable and sustainable health outcomes.[1]

Structured Process of Health Planning

Pre-Planning

Health planning starts with strong political commitment, clear health policies, and supportive legislation. Dedicated planning units at both the state and central levels are essential for effective planning.

Situation Analysis

The current health situation is assessed using data from reports, research, surveys, and census records. This includes information on population characteristics, health facilities, available resources, and training institutions.

Projection of the Health Situation

It involves forecasting future health trends and requirements over the planned period or a longer timeframe. This step ensures that adequate resources are allocated and sustainable strategies are developed to meet future demands. Key elements of health situation projection include:

Trend Analysis: Using historical health data to predict future patterns of diseases, mortality, and morbidity rates, considering factors such as demographic transitions, urbanisation, and lifestyle changes.

Resource Planning: Estimating the necessary human resources, financial investments, and infrastructure needed to address future health challenges.

Scenario Modelling: Developing potential scenarios based on varying assumptions, such as changes in population growth, healthcare utilisation, and the introduction of new technologies or interventions.

Risk Assessment: Identifying potential health risks, including emerging diseases, environmental changes, and socioeconomic factors, to prepare for unforeseen challenges.

Target Setting: Establishing measurable and achievable health goals for the projected period, ensuring alignment with national and global health priorities.

Health Challenges Identification

Based on data analysis, priority health problems and challenges are identified. Examples include gaps in human resources, disparities in service availability, and the rising burden of diseases.

Priority Selection

Health challenges are ranked by considering factors such as economic feasibility, technical requirements, administrative ease, and ethical concerns. Scientific methods, like Disability-Adjusted Life Years (DALYs), are often used to ensure objective prioritisation.

Defining Goals and Objectives

Goals provide long-term direction, while objectives specify precise, measurable outcomes. Objectives are categorized as ultimate, intermediate, or immediate to ensure clarity in implementation.

Plan Formulation

A detailed written plan is developed, including timelines, implementation procedures, and rules. This provides a clear framework for executing and evaluating the health program.

Strategy Development

Strategies are devised to strengthen health systems, integrate different sectors, and launch new programs or interventions as needed. For example, initiatives like the National Rural Health Mission were part of strategic planning.

Implementation

Successful implementation relies on coordination and commitment across all administrative levels, from central ministries to village-level workers.

Monitoring

Regular monitoring ensures that the program remains on track to meet its objectives. It involves comparing progress against pre-set targets and addressing deviations promptly.

Evaluation

The effectiveness and cost-efficiency of the program are assessed through evaluation. This helps measure whether objectives have been achieved and identifies areas for improvement.

Replanning

Insights from evaluation are used to update and refine the plan. This continuous feedback loop ensures adaptability and long-term success of health interventions.[1]

Governance and Planning in India

India's health planning machinery consists of various entities operating at national, state, and local levels to ensure comprehensive and effective planning. These include the Planning Commission (replaced by NITI Aayog), state planning boards, and other related organisations.

National Level: Planning Commission (Now NITI Aayog)

Established in 1950, the Planning Commission was responsible for formulating five-year and annual plans. The body included members such as the Prime Minister (Chairman), Deputy Chairman, ministers, and experts. Its structure comprised the following components:

1. General Divisions: Focused on overall planning and policy formation.
2. Subject Divisions: Specialised in areas such as health, education, and rural development.
3. Housekeeping Divisions: Handled administrative functions.

In 2015, the Planning Commission was replaced by NITI Aayog, which acts as a policy think tank to promote cooperative federalism and innovation in governance.

Table 4.2: Summary of India's Five-Year Plans – Focus Areas and Achievements. https://www.mospi.gov.in/sites/default/files/Statistical_year_book_india_chapters/ch7.pdf

Plan	Years	Focus Areas	Achievements
First Plan	1951–1956	Agriculture, price stability, power, and transport.	Achieved food self-sufficiency and controlled inflation; rehabilitation of refugees was successful.
Second Plan	1956–1961	Rapid industrialisation with a focus on heavy industries (Mahalanobis Plan).	Moderately successful; faced forex shortages and inflation.
Third Plan	1961–1966	Self-reliance, self-generating economy; agriculture prioritised.	Failed due to Chinese aggression (1962), Indo-Pak War (1965), and severe drought (1965–66).
Plan Holiday	1966–1969	Focus on agriculture due to food shortages and crisis.	New agricultural strategies (high-yield seeds, fertilizers, irrigation) introduced; paved the way for planned growth.
Fourth Plan	1969–1974	Growth with stability and self-reliance; focus on agriculture.	Success in early years; influx of Bangladeshi refugees, poor monsoon, and economic crises led to failure in later years.
Fifth Plan	1974–1979	Removal of poverty (Garibi Hatao) and self-reliance.	Initially successful but terminated early due to political changes; introduced the 20-point program during the Emergency.
Rolling Plan	1978–1980	Emphasis on employment and poverty reduction.	Short-lived due to political instability; laid groundwork for future plans.
Sixth Plan	1980–1985	National income growth, modernisation, poverty alleviation, and population control.	Successful in most targets; schemes like TRYSEM and NREP supported skill development and rural employment.
Seventh Plan	1985–1990	Food, work, and productivity; focus on employment and social justice.	Achieved 6% growth; moved past the "Hindu rate of growth."
Eighth Plan	1992–1997	Liberalisation, privatisation, and globalisation; focus on fiscal reforms and growth.	Achieved 6.8% growth; strengthened agriculture, industry, and exports.

Ninth Plan	1997–2002	Growth with social justice and equity; focus on agriculture and rural development.	Achieved 5.4% growth; highlighted private sector's role while prioritizing education and health.
Tenth Plan	2002–2007	Balanced development; reduction in poverty and gender inequality; focus on literacy and health.	Achieved 7.6% growth; emphasised state involvement and Panchayati Raj Institutions.
Eleventh Plan	2007–2012	Faster and more inclusive growth; emphasis on health, education, and employment generation.	Achieved 8% growth despite global financial crises; reduced poverty and improved literacy and infrastructure.
Twelfth Plan	2012–2017	Faster, sustainable, and inclusive growth; focus on environmental sustainability, health, and skill development.	Growth slowed to 5–6% due to global financial crises and domestic challenges; significant progress in poverty reduction and infrastructure development.

Planning Process at the Ministry of Health and Family Welfare

The Ministry of Health and Family Welfare plays a central role in health planning. Its key functions include:

1. Preparing national five-year health plans and ensuring alignment with overall development goals. (Table 4.2)
2. Developing strategies for approval and financing of health plans.
3. Coordinating with states on planning, implementation, and financing.
4. Compiling progress reports for evaluation and future improvements.

State Level: State Planning Boards

Each state has a planning board that drafts the state's health and development plans. These boards coordinate with district administrations, experts, and stakeholders to ensure inclusive and need-based planning. State boards revise plans based on feedback from the National Development Council and other bodies before finalising them for implementation.

National Development Council (NDC)

The NDC, chaired by the Prime Minister, serves as an advisory body to integrate state and central plans. It includes Chief Ministers of all states, Planning Commission members (now NITI Aayog), and union ministers as invitees. The council reviews and approves the draft national plan before it is sent to Parliament and state legislatures.

Decentralised Planning Approach

India has increasingly emphasised decentralised planning to include local bodies like Panchayats and municipalities in the decision-making process. This "bottom-up" approach ensures that plans are tailored to the specific needs of communities and resources are utilised effectively.

This collaborative structure ensures that planning in India aligns with both local and national priorities, promoting equitable development and efficient resource use.

Transformation through NITI Aayog

The National Institution for Transforming India (NITI Aayog) was constituted through a resolution of the Union Cabinet on January 1, 2015, to serve as the apex policy think tank of the Government of India. It plays a central role in shaping evidence-based policy directions and long-term development strategies. In addition to formulating national-level plans and reforms, NITI Aayog extends strategic and technical guidance to the Central Government, as well as to individual States and Union Territories. Functioning as a collaborative platform, it facilitates coordinated

policy-making between the Centre and States, thereby reinforcing the principles of cooperative federalism in pursuit of shared national priorities.

Objectives of NITI Aayogs

a. Formulating a Unified Development Vision

It aims to build consensus on national developmental goals, aligning sectoral priorities and strategic interventions with active participation from States to ensure region-specific needs are addressed within a unified national framework.

b. Strengthening Cooperative Federalism

By facilitating structured partnerships and continuous engagement with States, NITI Aayog promotes shared responsibility in development. It acknowledges that empowering States is essential for strengthening the overall fabric of the nation.

c. Decentralised Planning Through Village-Level Engagement

The institution advocates for planning models that begin at the grassroots level and are systematically integrated into higher tiers of governance, thereby ensuring community participation and contextual relevance.

d. Mainstreaming National Security Concerns in Policy

In domains where national security is a priority, NITI Aayog ensures that related considerations are incorporated into broader economic and strategic planning frameworks.

e. Focusing on Vulnerable and Marginalised Populations

The agency prioritises policies aimed at uplifting communities that are at risk of being left behind in the process of economic growth, thereby addressing inequalities in access and opportunity.

f. Strategic Policy Design and Continuous Monitoring

It facilitates the formulation of long-term policy frameworks and implementation strategies. Systematic monitoring and feedback mechanisms enable mid-course corrections and evidence-informed improvements.

g. Fostering Global and National Knowledge Partnerships

NITI Aayog encourages collaboration with international think tanks, academic institutions, and domestic experts to strengthen policy research and innovation ecosystems.

h. Developing a Robust Innovation and Entrepreneurship Ecosystem

By supporting a collaborative network of innovators, entrepreneurs, and practitioners, it aims to nurture knowledge-driven, solution-oriented development approaches.

i. Facilitating Inter-Sectoral and Inter-Departmental Convergence

The platform promotes synergy across sectors and departments to address overlapping challenges and accelerate the execution of complex development agendas.

j. Establishing Knowledge Repositories and Best Practice Hubs

It maintains advanced resource centres that curate governance models, sustainable practices, and equity-driven policies, making them accessible for adaptation and dissemination.

k. Program Evaluation and Resource Mapping

The institution monitors the performance of flagship schemes and helps identify resource gaps, ensuring that implementation is both efficient and impactful.

l. Technology-Driven Capacity Enhancement

Emphasis is placed on upgrading institutional and technological capacities to improve the delivery of programmes and promote innovation in governance.

m. Facilitating Dynamic and Responsive Development Models

NITI Aayog retains the flexibility to take on additional roles as needed to align ongoing developmental efforts with evolving national priorities and emerging challenges.

Table 4.3: Functional pillars of NITI Aayog[27].

S.No.	Pillar	Core Functions	Key Initiatives and Outcomes
1	Policy and Programme Framework	Develops long-term, evidence-based development strategies aligned with national goals. Focuses on inclusive growth through localised planning.	Aspirational Districts Programme improved indicators in health, education, and infrastructure. - Atal Innovation Mission (AIM) and over 7,000 Atal Tinkering Labs fostered innovation in schools. - SDG localisation tools developed.
2	Cooperative and Competitive Federalism	Promotes structured collaboration between the Centre and States, enabling state-specific contributions to national development. Also encourages states to compete on governance and innovation metrics.	Governing Council meetings ensure state participation in policy-making. - Aspirational Districts Programme involved states in targeted developmental planning. - State Institutes for Transformation (SITs) created in Karnataka and Maharashtra.

S.No.	Pillar	Core Functions	Key Initiatives and Outcomes
3	Monitoring and Evaluation	Tracks policy implementation and outcomes using real-time dashboards and rigorous data systems. Also conducts program evaluations to ensure accountability and effectiveness.	Development Monitoring and Evaluation Office (DMEO) established. - CoC 2.0 dashboard enables district-level performance tracking. - Evaluations of schemes in sectors like energy, roads, and food security conducted.
4	Think Tank and Knowledge Hub	Functions as an intellectual and advisory center by engaging with global and national institutions, producing evidence to guide policy formulation and innovation.	Partnered with WHO, UNICEF for joint health projects. - India Innovation Index ranks states on innovation metrics. - Hosted Economists' Huddle and published best practice reports to facilitate cross-learning.

Recent Trends in India's Health Planning

India's contemporary public health planning reflects a marked shift toward strengthening governance structures, decentralising responsibilities, and improving service delivery across rural and urban regions. A significant step in this direction has been the introduction of the Public Health Management Cadre (PHMC) in 2022. This initiative aims to develop a dedicated and skilled public health workforce equipped to deliver essential functions such as disease surveillance, planning, and health promotion. Unlike traditional models where clinical personnel handled administrative responsibilities, PHMC emphasises appointing professionally trained public health managers across all states. Despite varying levels of implementation—Odisha and Gujarat progressing steadily while others lag—this reform has laid the groundwork for institutionalising public health as a distinct discipline within India's healthcare governance framework.[12]

Complementing these governance reforms is the strategic expansion of public health infrastructure through the Pradhan Mantri Ayushman Bharat Health Infrastructure Mission (PM-ABHIM). This flagship program aims to fill critical gaps by operationalizing Health and Wellness Centres (HWCs), establishing Critical Care Blocks in district hospitals, and setting up Integrated Public Health Labs in all districts. Notably, the program also includes support for Block Public Health Units in eleven high-focus states to reinforce decentralised planning and disease management capacity. These infrastructural enhancements are designed not only to improve rural access but also to prepare the health system for emerging threats like pandemics.[28]

To ensure bottom-up involvement in planning and service delivery, fiscal

federalism has been strengthened through the Fifteenth Finance Commission (FC-XV) grants. Spread over five years (2021–2026), these untied grants are directed to local governments with the specific objective of reinforcing primary care and grassroots health governance. This shift empowers Panchayati Raj Institutions and urban local bodies to tailor interventions to community-specific needs, thus promoting more responsive and accountable planning at the local level.[28]

Parallel efforts have also been made to reduce geographic imbalances in tertiary care and medical education through the Pradhan Mantri Swasthya Suraksha Yojana (PMSSY). The scheme focuses on the establishment of new All India Institute of Medical Sciences (AIIMS) institutes and the upgradation of existing Government Medical Colleges (GMCs). In addition, the Centrally Sponsored Scheme (CSS) supports new medical colleges in underserved and aspirational districts, prioritising regions lacking access to specialized care. Together, these initiatives contribute to long-term planning for human resource availability and tertiary service provision in backward regions.[28]

To operationalise these institutional and infrastructural advancements, targeted human resource strategies have been introduced under the National Health Mission (NHM). These include monetary incentives such as hard-area allowances for specialists and performance-based honorariums, as well as non-monetary benefits like preferential admission into postgraduate programs for those serving in difficult areas. Flexibility in recruitment policies, multi-skilling of doctors, and task-sharing among health workers have been adopted to mitigate specialist shortages. Such efforts are indicative of a broader shift toward context-responsive human resource planning, with an emphasis on equity and service retention in rural areas.[28]

While structural reforms are underway, governance challenges continue to impact implementation. Field-level insights—particularly from states like Uttar Pradesh—highlight persistent gaps in coordination, monitoring, and the use of data for decision-making. Even with infrastructural provisions, service delivery is often limited by understaffing, weak referral linkages, and fragmented programmatic planning. Experts have underscored the importance of institutional monitoring, decentralized leadership, and inter-departmental coordination to address these system-level inefficiencies and achieve quality assurance in health services.[29]

A broader systems-thinking approach has also brought attention to the role of intersectoral collaboration in health planning. The intersection of health with sanitation, housing, nutrition, education, and gender equity necessitates planning frameworks that go beyond departmental silos. Past initiatives such as NRHM, NUHM, ICDS, and NACP have demonstrated the potential for convergence, but operationalising

integrated governance at scale remains a challenge. Health outcomes can only be sustainably improved when determinants outside the health sector are factored into program planning and implementation.[30]

India's adoption of the World Health Organization's Essential Public Health Functions (EPHF) model underscores its commitment to strategic governance reforms. The PHMC is aligned with EPHF principles, promoting leadership, regulation, financing, and service delivery as key public health functions. However, realignment requires not just structural frameworks but also investment in public health education, creation of career pathways, and system-wide coordination across ministries and departments.[26]

In conclusion, recent policy measures in India reflect a progressive reorientation of public health planning, marked by decentralization, strategic financing, and capacity-building. Institutional reforms such as the PHMC, alongside programs like PM-ABHIM and PMSSY, indicate a shift from ad-hoc service expansion to structured and evidence-driven public health systems. Yet, the real test lies in overcoming the long-standing bottlenecks in implementation, ensuring local ownership, and sustaining intersectoral collaboration to meet the evolving health needs of the population.[12,26]

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CHAPTER

5

Healthcare Service Delivery Across India

Rural–Urban Disparities in Healthcare Infrastructure

India's healthcare landscape is marked by a pronounced rural–urban divide. While over two-thirds of the country's population resides in rural areas, a disproportionate share of healthcare infrastructure and workforce is concentrated in urban centres. The rural health system is designed as a three-tiered structure encompassing Sub-Centres (SCs), Primary Health Centres (PHCs), and Community Health Centres (CHCs). Despite this framework, the actual infrastructure is insufficient and under-resourced. As per the Rural Health Statistics, significant gaps exist: nearly 48,000 sub-centres and 9,700 PHCs are yet to be established. Furthermore, around one-fifth of PHCs lack a doctor, and 83% of CHCs fall short of the specialist doctors they are mandated to have.

In contrast, urban areas benefit from a dense distribution of healthcare providers, both public and private. Urban public health facilities are being expanded under the National Urban Health Mission, yet they remain inadequate relative to population needs. The urban poor often confront overcrowded government hospitals or unaffordable private options. An evident marker of disparity is the health workforce distribution—urban regions have three to four times more health professionals per capita compared to rural areas. This includes doctors, nurses, and allied professionals, making it more difficult for rural patients to access diagnostic and specialist services. Government interventions like the Accredited Social Health Activists (ASHAs) have improved rural outreach, but are not a replacement for fully functioning facilities.[1, 31]

Levels of Healthcare Services: Primary, Secondary, and Tertiary

India's healthcare system operates through a hierarchical service model encompassing primary, secondary, and tertiary levels.

Primary Care

Primary care, considered the foundational tier, includes preventive and promotive services delivered through sub-centres, PHCs, and urban health centres. The recent introduction

of Health and Wellness Centres (HWCs) under Ayushman Bharat aims to offer a wider range of services, such as non-communicable disease screening, mental health support, and elderly care. By the end of 2022, over 150,000 HWCs were functional, achieving the national target.[32] However, the quality of care remains inconsistent, with more than 70% of PHCs not complying with Indian Public Health Standards (IPHS).[31]

Secondary Care

Secondary care is typically delivered at CHCs and district hospitals, which are meant to serve as referral centres for PHCs and handle moderately complex cases requiring hospitalisation, surgeries, or specialist interventions. Despite their importance, secondary care centres face significant human resource challenges, particularly the lack of specialists. Private mid-sized hospitals and nursing homes also provide secondary care, often becoming the first point of contact for patients bypassing the primary level—especially in urban regions. Strengthening secondary care remains a strategic objective, as its inadequacy leads to excessive patient load on tertiary institutions.[31]

Tertiary Care

Tertiary care, the apex level, comprises specialised services typically available at medical colleges, national institutes (such as AIIMS), and corporate hospitals. These centres offer advanced interventions like organ transplants, oncology treatment, and critical care. However, access to such facilities is highly inequitable, often limited to urban and wealthier populations. Rural and marginalised groups must travel long distances and bear high costs, highlighting the need for improved referral systems and expanded infrastructure in underserved regions.[1, 31]

Healthcare Financing in India

India's healthcare financing has historically been skewed toward private spending, with a significant burden placed on individuals through out-of-pocket expenditure (OOP). Public health expenditure remained below 1% of GDP for decades. However, the National Health Policy (2017) aimed to increase this to 2.5% by 2025. Government spending has gradually risen, reaching approximately 1.9% of GDP in 2023–24. Public funding is channelled through centrally sponsored schemes, state health budgets, and special health cesses, supporting initiatives like the National Health Mission and Ayushman Bharat.[1, 33]

OOP continues to form a large share of total health expenditure, though declining in recent years—from over 60% in the early 2010s to approximately 39% by 2021–22. This reduction reflects efforts like free diagnostics, subsidised medicines, and increased use of public facilities. Yet, high OOP costs—particularly on medications and outpatient care—still pose financial risks, often pushing families into poverty.

Expanding free drug supply chains and rationalising private sector pricing remain policy priorities.[1, 33]

Health insurance mechanisms have expanded with schemes such as the Pradhan Mantri Jan Arogya Yojana (PM-JAY), which covers up to ₹5 lakh per family annually for hospitalisation. PM-JAY, targeting over 500 million individuals, is tax-funded and operates via both public and empanelled private hospitals. States also have parallel or merged schemes, enhancing population coverage. However, most insurance plans focus on inpatient care, leaving outpatient and preventive services uncovered. Moreover, many eligible families remain unenrolled or underutilise these benefits due to awareness and access barriers.[34]

Government Initiatives and Health System Reforms

The Indian government has undertaken multi-pronged reforms to strengthen healthcare delivery. The National Health Mission (NHM), combining rural and urban health efforts, has enhanced service coverage, deployed over 900,000 ASHAs, and introduced schemes like Janani Suraksha Yojana for maternal care.[31] Innovations like Mobile Medical Units (MMUs) and ambulance services have improved last-mile access.[35] Additionally, flexible funding mechanisms under NHM allow local tailoring of interventions.[31]

Ayushman Bharat represents a paradigm shift in India's pursuit of Universal Health Coverage (UHC). Its twin pillars—Health and Wellness Centres and PM-JAY—strengthen primary care and offer financial protection for hospital-based care.[32] The program not only improves access but also encourages infrastructure upgrades in public hospitals, especially those empanelled under PM-JAY.[34] Other important policy reforms include the National Health Policy (2017), which laid the foundation for these interventions and emphasised preventive health, public-private partnerships, and strategic purchasing of services.[1, 33]

Digitisation of health services is another major reform focus. The Ayushman Bharat Digital Mission (ABDM) aims to create a unified health ecosystem through health IDs (ABHA), provider registries, and integrated platforms. Complementary initiatives like eSanjeevani have enabled millions of teleconsultations, especially during the COVID-19 pandemic. These efforts enhance efficiency, improve data-driven decision-making, and extend services to remote regions.[33]

Persistent Challenges in Healthcare Delivery

Despite progress, India's health system faces substantial structural and functional challenges. Funding remains inadequate, with public expenditure still below global averages.[33] Infrastructure gaps persist, especially in rural and tribal areas, where

facilities lack essential equipment, medicines, and maintenance.[31] Fragmented funding streams and weak inter-programme coordination further dilute impact.[1, 33]

Human resource shortages are another major barrier. The uneven distribution of doctors and nurses, especially specialists in CHCs and district hospitals, impairs service delivery.[31] Even with measures like increased medical college seats and Community Health Officers (CHOs), the workforce deficit in remote areas continues.[33] Informal providers often fill these gaps, raising concerns around quality and patient safety.[32]

Quality of care is compromised by systemic issues, such as absenteeism, poor infrastructure, and inadequate oversight.[32] The Clinical Establishments Act remains poorly implemented, particularly in the private sector.[34] Accreditation schemes (like NABH and NQAS) are expanding but have not yet achieved universal coverage. Initiatives like Kayakalp promote hygiene and infection control but require scale-up and enforcement.[1, 33]

Finally, ensuring equitable access for all segments of society—including women, tribal groups, and the disabled—remains a complex challenge. Direct and indirect costs, cultural barriers, and systemic neglect contribute to exclusion. Government schemes have begun to address some gaps (e.g., targeted insurance coverage for transgenders and informal workers), but deeper structural reforms are required for inclusive, accountable, and resilient healthcare delivery.[31]

Oral Health within the Healthcare Delivery System

Although oral diseases are among the most prevalent chronic conditions, oral healthcare continues to be underrepresented within India's public health system. Findings from performance audits, national guidelines, and empirical studies highlight persistent deficiencies in infrastructure, human resources, and service utilisation.[36, 37]

Rural–Urban Divide in Oral Health Infrastructure

The CAG audit of Himachal Pradesh reported the non-availability of dental X-ray facilities in three district hospitals, three civil hospitals, and three community health centres, alongside inadequate diagnostic and prosthodontic services. Similarly, the Haryana audit noted that despite the presence of tertiary and district-level institutions, infrastructure for comprehensive dental care was either missing or underutilised. These deficits force rural residents to depend on urban centres or private providers for even basic dental services.[36, 37]

Deficiencies in Workforce and Facilities

Human resource shortages extend sharply to oral health. India has 278,687 registered dentists, with an average dentist-to-population ratio of 1:5,000 nationally. However, this masks severe inequalities: in rural Andhra Pradesh, the ratio was as high as 1:91,484 in

Nellore district.[38] In Mangalore taluk, only 26% of health centres (6 of 23) had dental services available.[39] The Prakasam district study revealed that although all 12 CHCs had at least one dentist, a dental chair, and a dental room, none had dental hygienists or assistants, restricting service provision to scaling, restorations, and health education.[40]

Utilisation and Demand Barriers

Even when dental services are available, utilization is limited. In Prakasam district, only 13.9% of surveyed households reported accessing CHC dental services in the previous year.(40) Contributing factors included lack of awareness, low perceived need, and accessibility barriers. Similarly, in Nellore district, only 18 out of 95 public health centres offered dental services, and none met the Indian Public Health Standards (IPHS) requirements for workforce or equipment.[38]

Policy Standards versus Ground Realities:

The IPHS 2022 guidelines for Community Health Centres mandate at least one dental surgeon, basic dental equipment (chair, X-ray, extraction sets), and provision of preventive and promotive oral healthcare.[41] Yet, implementation remains weak. CAG audits confirmed the non-availability of dental X-rays in multiple facilities and lack of oral healthcare integration into maternal and child health services.[36, 37]

Oral Health Inequalities and Systemic Neglect

2023 scoping review synthesised evidence from 71 studies and concluded that oral health inequalities in India are systemic, unfair, and avoidable. Contributing factors included uneven distribution of the dental workforce, limited public sector provision, and socioeconomic barriers. The review emphasised restructuring of the dental workforce, scaling preventive services, and embedding oral health into universal health coverage strategies.[42]

Persistent Challenges and the Way Forward

Data from the reviewed studies collectively highlight the following:

1. Dentist-to-population ratio: National average 1:5,000, but up to 1:91,484 in rural areas like Nellore.[38, 40]
2. Coverage of dental services: Only 18.9% (18/95) PHCs in Nellore provided any dental service.[38]
3. Availability at CHCs: In Prakasam district, 100% of CHCs (12/12) had a dentist, but services were basic and underutilised.
4. Service utilisation: Merely 13.9% of households accessed CHC dental services in a year.[38]

5. Infrastructure shortfalls: Multiple states lacked adequate dental capacity at district hospitals.

Unless oral health is embedded into broader reforms under Ayushman Bharat, the National Oral Health Programme, and strict enforcement of IPHS 2022, the gap between policy standards and community realities will persist. Strengthening human resource distribution, infrastructure compliance, and preventive outreach is essential for achieving Universal Oral Health Coverage (UOHC) in India.

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CHAPTER

6

National Health Mission: A Flagship Health Reform

The National Health Mission (NHM), launched in 2013, represents India's comprehensive approach to achieving universal access to equitable, affordable, and quality healthcare services. It consolidated the National Rural Health Mission (NRHM, 2005) and the National Urban Health Mission (NUHM, 2013) under a unified framework to strengthen public health systems across both rural and urban landscapes. NHM covers a broad spectrum of services including reproductive, maternal, newborn, child and adolescent health (RMNCH+A), as well as both communicable and non-communicable diseases, with a strong emphasis on health systems strengthening and community engagement.

Guided by the National Health Policy 2017, the vision of NHM is to ensure the "attainment of the highest possible level of health and well-being at all ages" through preventive, promotive, curative, and rehabilitative services without financial hardship. This is aligned with India's commitment to Sustainable Development Goal 3 on health and well-being and the broader objective of Universal Health Coverage (UHC).[1, 43]

Human Resources and Infrastructure Strengthening

NHM has significantly enhanced India's healthcare capacity by investing in infrastructure and human resources. From FY 2021–24, over 12 lakh additional healthcare personnel were engaged under NHM, including general duty medical officers (GDMOs), staff nurses, specialists, and over 3.5 lakh Community Health Officers (CHOs). This expansion has been vital in improving service delivery at the grassroots level.[43]

Accredited Social Health Activists (ASHAs), numbering over 9 lakh, serve as essential community-based workers bridging the population with health services. Simultaneously, states have used NHM's Program Implementation Plans (PIPs) to recruit dentists and procure dental equipment at Community Health Centres (CHCs), thereby strengthening the platform for oral health integration into the public health system.[1, 44]

During the COVID-19 pandemic, NHM played a pivotal role in India's response. Leveraging its extensive network of health facilities and personnel, NHM facilitated

the administration of over 220 crore vaccine doses between January 2021 and March 2024. This massive effort was supported through the India COVID-19 Emergency Response and Health Systems Preparedness Package (ECRP), implemented in two phases under NHM to strengthen emergency response capacity.[44]

Key Public Health Achievements (2021–24)[44]

NHM has been instrumental in achieving significant improvements in health indicators:

1. Maternal Mortality Ratio (MMR) declined from 130 (2014–16) to 97 per 1,00,000 live births (2018–20), marking an 83% reduction since 1990 – higher than the global decline of 45%.
2. Under-5 Mortality Rate (U5MR) dropped from 45 to 32 per 1,000 live births between 2014 and 2020.
3. Infant Mortality Rate (IMR) declined from 39 to 28 per 1,000 live births during the same period.
4. Total Fertility Rate (TFR) fell from 2.3 in 2015 to 2.0 in 2020
5. Over 4.53 lakh patients benefited under the Pradhan Mantri National Dialysis Programme.
6. 1.56 lakh Ni-kshay Mitras supported over 9.4 lakh TB patients under the Pradhan Mantri TB Mukt Bharat Abhiyan.
7. Kala-azar elimination targets met, and U-WIN pilot launched for digitizing immunization events.

Ayushman Arogya Mandirs and Free Services

As part of Ayushman Bharat, NHM operationalised over 1.77 lakh Ayushman Arogya Mandirs (AAMs) by June 2025, far exceeding the initial target of 1.5 lakh. These upgraded Sub-Health Centres (SHCs) and Primary Health Centres (PHCs) now deliver comprehensive care, including oral health, ENT, and mental health services.

Under the Free Drugs and Diagnostics Initiative, 106 essential medicines and 14 diagnostic tests are provided at SHC-AAMs and 172 drugs and 63 tests at PHC-AAMs to ensure access without out-of-pocket expenditure.[43]

Oral Health Integration in NHM

A hallmark of NHM's expansion has been the integration of oral health services into primary care. Many states, using NHM's PIP funding, have hired dental officers at CHCs and PHCs and initiated dental screening camps. Oral health has also been formally included in the Comprehensive Primary Health Care (CPHC) package, one of the 12 key service areas of Ayushman Arogya Mandirs.

By January 2023, over 1.56 lakh HWCs were providing basic curative and preventive dental services, including oral cancer screening, patient referrals, and health promotion. Community Health Officers (CHOs) are trained using tools like the Community Based Assessment Checklist (CBAC) to identify tobacco users and oral lesion symptoms.[1, 43]

Community Participation and Oral Health Promotion

NHM emphasises community engagement through mechanisms such as Village Health, Sanitation and Nutrition Committees (VHSNCs) and Rogi Kalyan Samitis. These platforms are being used to integrate oral health messages during Village Health and Nutrition Days, with ASHAs conducting brushing demonstrations and oral hygiene promotion.

A dedicated Oral Care Training Module for ASHAs under Ayushman Bharat equips them to identify common oral problems and promote preventive measures like the use of fluoridated toothpaste. These efforts are particularly important in rural areas with limited dental access.[1, 43]

Programmatic Convergence for Oral Health

NHM fosters programmatic convergence to integrate oral health with broader health initiatives. For example, under the Rashtriya Bal Swasthya Karyakram (RBSK), children in schools and Anganwadis are screened for 30 conditions, including dental caries and cleft lip/palate. Referrals are made to nearby dental facilities established under the National Oral Health Programme (NOHP).

NHM also complements the Poshan Abhiyaan by promoting practices like breastfeeding and reduced sugar consumption to prevent early childhood caries. The Health Management Information System (HMIS) now includes dental indicators such as the number of dental procedures conducted, extending formal accountability for oral healthcare.[43]

Innovations at State Level

Some states have leveraged NHM's flexibility to deepen oral health integration. For example, Tamil Nadu and Karnataka have introduced mobile dental vans, while Maharashtra has incorporated oral health into its NCD clinics at PHCs. Though challenges such as workforce shortage persist, these innovations underscore NHM's potential for state-level customization and scale-up.[43]

The National Health Mission has been a transformative force in India's healthcare landscape, not only advancing core health outcomes but also paving the way for the integration of oral health into routine care. Through investments in infrastructure, workforce, community participation, and digital monitoring, NHM creates the

foundation for a holistic, equitable, and responsive health system. Going forward, greater institutionalisation of dental services at the primary care level—such as routine dental screenings for pregnant women and diabetics—will be essential for realising the vision of Universal Health Coverage in its truest sense.

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CHAPTER

7

Oral Diseases Burden in India

Oral diseases are among the most prevalent non-communicable conditions globally, yet they often receive inadequate attention in public health policy frameworks, particularly in low- and middle-income countries like India. These diseases are not only widespread but also significantly impact individuals' general health, productivity, and quality of life. Despite advancements in healthcare and an increase in dental professionals, India continues to face a persistently high burden of oral diseases. Multiple determinants—ranging from behavioral and socioeconomic factors to systemic health inequities—contribute to this scenario. A comprehensive understanding of the oral disease burden is critical for formulating integrated and equity-oriented health strategies in India.[25, 45]

Prevalence and Epidemiological Trends

Recent national and global datasets have provided clear evidence that oral diseases remain widespread in India. According to WHO's 2022 country profile, nearly 43.3% of children aged 1–9 years suffer from untreated caries in their primary dentition, while 28.8% of individuals aged 5 years and above have caries in their permanent teeth. Severe periodontal disease affects 21.8% of adults over 15 years, and complete tooth loss (edentulism) is seen in 4% of individuals aged 20 years and above.[46]

A study by Batra et al., further emphasises that dental caries prevalence escalates with age, reaching up to 84.7% among those aged 65–74 years. Periodontal conditions, including pockets and calculus, are especially prevalent among middle-aged and elderly adults. Additionally, 42% of adults aged 35–44 years exhibit some degree of malocclusion, while fluorosis affects up to 12.1% of 12-year-olds in certain regions. Oral mucosal lesions are found in nearly 10% of the elderly population, and oral cancer—though potentially underreported—has a recorded prevalence of 0.4%.[47]

Despite the growing number of dental institutions and professionals, these epidemiological trends highlight a disconnect between service availability and population-level oral health outcomes.

Disability-Adjusted Life Years (DALYs) and Stagnation

Global Burden of Disease (GBD) data indicate that India lost approximately 2.66 million disability-adjusted life years (DALYs) annually due to oral disorders between 1990 and 2015. The age-standardised burden of oral diseases remained stable during this period, with oral disorders contributing between 0.83% and 1.09% of the national total DALYs. In contrast, the DALYs associated with other health conditions declined during the same timeframe. This stagnation suggests that while broader health interventions have shown measurable improvements, oral health remains an area of systemic underperformance.[48]

Risk Factors and Oral Health Behaviors

A wide array of modifiable risk factors contributes to the oral disease burden in India. Tobacco use, both smoked and smokeless, remains a major driver of periodontal disease and oral cancers. National estimates reveal that 28.1% of individuals aged 15 years and above are current tobacco users, with a significantly higher prevalence among males (42.4%) compared to females (13.7%). Additionally, the average daily per capita sugar availability stands at 53.8 grams, a figure that is closely associated with high caries prevalence.[46]

Findings from the Oral Health Observatory (OHO) study revealed that routine dental visits declined sharply after age 35–44, while emergency-based dental care usage continued among adults up to 64 years. Brushing habits were suboptimal, with only 44.7% of the population brushing twice daily and 36.7% brushing before bed. Men were found to experience more frequent oral pain and disruptions in daily functioning due to dental issues.[25]

Economic Burden

The economic implications of oral diseases are substantial and multifaceted. In 2019, India incurred approximately USD 7.25 billion in productivity losses due to five major oral conditions, while actual spending on dental health care amounted to only USD 64 million—roughly USD 0.05 per capita.[46] A more recent review pegged the annual economic burden at INR 613.2 billion, with households spending an average of INR 4,368 per year on dental care. Notably, the cost of preventive care in tertiary facilities like AIIMS was as low as INR 10 per person per year, yet uptake remains limited. This disproportion between potential savings from prevention and the high cost of delayed treatment indicates significant systemic inefficiencies.[46]

Inequities in Access and Outcomes

Oral health inequalities in India are stark, driven by geographic, socioeconomic, and cultural disparities. Nearly 93% of the rural population lacks access to basic dental

care, primarily due to workforce concentration in urban centers and an absence of public infrastructure. While private providers dominate the dental sector, affordability remains a major constraint for low-income groups. Moreover, public dental services contribute to only 5% of total oral healthcare delivery in the country.

Additional layers of disparity are observed across caste, tribe, education, and gender. Women, for instance, often deprioritise their own oral health due to caregiving responsibilities, and scheduled caste and tribal populations report poorer oral health outcomes. These disparities reflect systemic exclusion that cannot be addressed without intentional policy correction.[45]

Gaps in Policy and Service Delivery

Despite being a critical component of overall health, oral health has historically been absent from key national health programs such as Ayushman Bharat, the National Health Mission (NHM), and the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS). Government-supported benefit schemes reach only about 30% of the population with essential dental services, and advanced or rehabilitative oral care is seldom included in public insurance packages.[47]

Furthermore, no nationwide oral health survey has been conducted since 2002. This lack of updated, large-scale surveillance data weakens the evidence base required for program planning and policy implementation.[25, 47]

Evidence-Based Recommendations for Oral Health Reform: (25, 45–48)

Tackling India's oral health burden requires comprehensive, evidence-informed, and equity-focused reforms:

Integrate Oral Health with National Health Programs

Oral health must be embedded within the structures of Ayushman Bharat, RBSK, NPCDCS, and school health programs. This includes routine screening, fluoride-based prevention, and tobacco cessation interventions.

Shift Toward Prevention and Health Promotion

There is a pressing need to transition from a curative to a preventive model. Community-based programs, particularly school- and workplace-centred interventions, should be scaled up.

Address Workforce Distribution and Training

Although India has a large dental workforce, its urban-centric distribution limits access. Measures such as rural deployment mandates, mobile dental clinics, and training of mid-level providers are essential for improving coverage.

Implement a National Oral Health Surveillance System

Regular national-level oral health surveys and integration of oral health indicators into broader health monitoring systems are critical for data-driven policymaking.

Expand Insurance and Public Financing for Oral Health

Inclusion of basic oral healthcare in publicly financed insurance schemes can reduce out-of-pocket expenditure and enhance service uptake among vulnerable populations.

Target High-Risk and Marginalised Populations

Interventions should prioritize tribal groups, rural populations, and socioeconomically disadvantaged communities through culturally tailored approaches.

Leverage Public–Private and Academic Partnerships

Dental colleges and NGOs can serve as outreach hubs, while private practitioners can be engaged in publicly financed service delivery through structured contracts and accountability mechanisms.

If these reforms are implemented systematically, India can move toward a more integrated, accessible, and equity-oriented oral health system, aligned with its national health priorities.

Oral diseases continue to be a silent epidemic in India, with a disproportionate burden falling on socioeconomically disadvantaged and rural populations. Despite the availability of trained dental professionals and tertiary care institutions, systemic barriers related to access, affordability, surveillance, and policy exclusion persist. The data overwhelmingly supports a paradigm shift from curative care to prevention, equity, and systemic integration. Investing in oral health is not merely a clinical or academic priority—it is a public health imperative that must be urgently addressed through coordinated, evidence-based policy reform.

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CHAPTER

8

Laying the Foundation: Draft Policy for Oral Health in India

Oral health is integral to overall health and quality of life, yet it remains inadequately addressed in India's public health agenda. Despite the escalating burden of oral diseases, the country lacks a fully implemented national oral health policy. Rapid urbanisation, increased consumption of processed foods, and widespread tobacco use have contributed to rising oral disease prevalence. At the same time, the systemic neglect of oral health in national programs has created persistent gaps in care delivery, especially among rural and underserved populations.[49, 50]

Historical Context and Policy Evolution

The formulation of a National Oral Health Policy was first attempted in 1995, aiming to create a structured, equitable oral health delivery system. However, the draft remained unimplemented, primarily due to limited political will and absence of financial allocation.[3] This failure, despite the increasing epidemiological burden of oral diseases, highlights the disconnect between disease prevalence and policy action.

Renewed momentum emerged with the release of the Draft National Oral Health Policy (2021) by the Ministry of Health and Family Welfare, which provides a comprehensive strategic framework aligned with the National Health Policy 2017. This draft emphasises equity, affordability, integration with primary care, regulation, and a robust monitoring mechanism, signifying a shift towards systemic reform.[49]

Burden of Oral Diseases in India: A Policy Imperative

The existing burden of oral diseases in India presents a strong rationale for policy intervention. As reported in the National Oral Health Survey (2002–03) and subsequent studies, the prevalence of dental caries ranges from 50–84.7%, periodontal diseases affect up to 89.2%, and potentially malignant disorders are found in 0.9–10% of the population.[51] Oral cancer, linked to high tobacco consumption, accounts for 13.9% of all cancers in India.[50]

These conditions lead to pain, functional limitations, lost work hours, and reduced quality of life. Additionally, evidence supports the association between poor oral

health and systemic illnesses, including diabetes, cardiovascular diseases, and adverse pregnancy outcomes.[50, 51] These interconnections further underscore the need to elevate oral health within national health priorities.

Systemic Barriers and Rural–Urban Disparities

India faces a stark rural–urban divide in access to oral healthcare. Over 90% of dentists are located in urban areas, which cater to less than a third of the population, whereas rural areas—home to nearly 69% of the population—are served by only 10% of dental professionals.[50, 51] This imbalance translates into dentist-to-population ratios of approximately 1:10,000 in urban and 1:250,000 in rural regions.

Moreover, oral health is not integrated into major public health programs such as the NHM or Ayushman Bharat. Financial barriers, lack of insurance coverage, and limited awareness compound the problem, particularly among socioeconomically disadvantaged groups.[50, 52] These disparities persist despite India having over 300 dental colleges producing approximately 25,000 BDS graduates annually.[51]

Draft Policy Framework (2021): Strategic Pillars[49]

The Draft National Oral Health Policy (2021) offers a multi-dimensional strategy for strengthening oral health systems in India. Its key components include:

1. Integration with primary healthcare: Embedding oral health into NHM, Ayushman Bharat Health and Wellness Centres, and school health programs.
2. Infrastructure development: Upgrading PHCs and CHCs with dental units; deploying mobile dental clinics in underserved areas.
3. Human resource strengthening: Training and engaging dental auxiliaries; task-sharing with ASHAs, ANMs, and Anganwadi workers.
4. Health promotion and IEC: Promoting oral hygiene through mass media, school-based activities, and community campaigns.
5. Regulatory and financial reforms: Introducing licensing and quality assurance mechanisms for dental practices; exploring insurance-based financing models.
6. Monitoring and surveillance: Establishing an oral health surveillance system integrated with national disease registries.

The policy articulates measurable targets for reducing oral disease prevalence and improving service delivery by 2025 and 2030.

Recommendations from Academia and Stakeholders[50, 52]

Experts in public health dentistry have proposed several actionable strategies to complement and strengthen the draft policy. These include:

1. Mobile dental services and tele-dentistry: Suggested as cost-effective solutions to bridge service gaps in rural and remote areas.
2. Public–Private Partnerships (PPP): Recommended to utilise infrastructure and expertise from private dental institutions for community-based services.
3. Geriatric and child-focused initiatives: Developing age-specific oral health promotion and screening programs.
4. Dental curriculum reform: Emphasis on public health, community postings, and behavioral sciences to orient graduates towards preventive care.
5. Training of non-dental personnel: Empowering ASHAs, school teachers, and Anganwadi workers to deliver basic oral health education and identify early disease.

Such recommendations align with broader health system goals and ensure that oral health is not addressed in isolation but as part of comprehensive, inclusive public health action.

From Policy Draft to Implementation

The policy groundwork has been laid. India possesses the necessary human resources to implement its oral health goals; what remains is the political will and systemic coordination to transform the draft policy into operational reality. A shift from reactive treatment-based care to proactive prevention and promotion is essential.

One proposed financing model is the Beveridge model, which relies on government-funded healthcare through taxation. Given that over 40% of India's population lives below the poverty line, such a publicly financed approach would ensure equitable access to oral healthcare for all.[51]

To succeed, the policy must be supported by legal mandates, dedicated funding lines, inter-ministerial collaboration, and periodic monitoring mechanisms. Engaging local governments, communities, and civil society will also be key to sustained impact.[49, 50]

India's continued struggle with preventable oral diseases reflects both systemic neglect and missed opportunities in health planning. The 2021 Draft National Oral Health Policy provides a timely and structured framework to address these long-standing issues. Its successful implementation will depend not only on institutional action but also on the commitment of healthcare providers, policymakers, and communities alike.

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CHAPTER

9

National Oral Health Program

Oral health plays a pivotal role in ensuring overall well-being and quality of life. However, in the context of India's healthcare landscape, oral health has historically received limited policy attention despite its substantial public health burden. Dental caries, periodontal diseases, edentulism, malocclusion, oral cancer, and conditions like fluorosis and oral submucous fibrosis are prevalent across all age groups and geographical regions. These conditions, while often preventable, contribute significantly to pain, disfigurement, nutritional compromise, and loss of productivity. Recognising these challenges, the Government of India launched the National Oral Health Programme (NOHP) to integrate oral health services into the primary healthcare system and ensure equitable access to essential dental care for all segments of the population.[53]

Rationale for the Programme

Oral diseases have far-reaching implications beyond localized discomfort. Scientific evidence has established strong associations between oral infections—particularly periodontal inflammation—and systemic conditions such as cardiovascular diseases, chronic obstructive pulmonary disease, diabetes mellitus, rheumatoid arthritis, and adverse pregnancy outcomes.[54]

In India, widespread oral health issues remain exacerbated by poor awareness, high out-of-pocket expenditure, and limited availability of public-sector dental services, especially in rural and underserved regions. Furthermore, oral health is intricately linked with socio-behavioral factors like tobacco use, alcohol consumption, poor hygiene practices, and inadequate diet, all of which are also risk factors for other non-communicable diseases (NCDs). Therefore, the integration of oral health into broader public health frameworks was both a timely and necessary intervention.

Goals and Objectives of NOHP[53, 55, 56]

The central goal of the NOHP is to enhance the oral health status of the Indian population by reducing the burden of oral diseases and improving access to quality dental care. This is achieved through a combination of preventive, promotive, curative, and rehabilitative services. The key objectives of the programme include:

1. Strengthening oral healthcare delivery systems at all levels of public health facilities.
2. Promoting evidence generation, research, and policy innovation for effective oral disease prevention and control.
3. Building the capacity of healthcare providers and public institutions for consistent oral health service delivery.
4. Integrating oral health into national programs under the National Health Mission (NHM), in line with broader commitments under the National Health Policy and the draft National Oral Health Policy.
5. Establishing Centres of Excellence at national, regional, and state levels to support research, training, and policy development.
6. Facilitating periodic monitoring and evaluation of programme implementation and outcomes.

Service Delivery Framework[53]

The NOHP is structured to ensure the continuum of oral healthcare through integration at various levels of the existing health system. The model adopts a tiered approach as follows:

1. Sub-centre level: Health workers are tasked with delivering oral health education, referring patients with dental issues to higher facilities, and maintaining basic records. Oral health is incorporated into routine sessions such as Maternal and Child Health Nutrition (MCHN) days.
2. Primary health centre (PHC): Medical Officers conduct daily outpatient services, organise oral health camps in coordination with other departments, and refer complex cases to Community Health Centres (CHCs) or district hospitals. PHCs are also responsible for maintaining systematic records of oral health activities.
3. Community health centre (CHC): CHCs serve as the First Referral Unit (FRU) for PHCs and host dental camps in collaboration with other sectors like education. Oral health services are delivered to schoolchildren referred under programs such as Rashtriya Bal Swasthya Karyakram (RBSK).
4. District Hospitals: These are equipped to manage advanced dental cases, including prosthodontic care (dentures), fracture management, and orthodontic consultation. Dental surgeons in these facilities also coordinate reports from lower-tier health units and ensure program convergence with NCD initiatives under NHM.

Infrastructure, Human Resources, and Materials[53]

To operationalise the NOHP, states receive financial assistance through their State Programme Implementation Plans (PIPs) under the NHM Mission Flexi Pool. These funds support:

1. Dental units: Establishment of clinics in district or sub-district facilities, based on existing infrastructure saturation.
2. Manpower recruitment: Contractual appointment of dental surgeons, hygienists, and assistants is permitted where required.
3. Equipment and consumables: Dental chairs, X-ray machines, sterilization units, and essential materials are procured to facilitate service delivery.
4. Training and IEC/BCC: The National Oral Health Cell under the Ministry of Health supports capacity building for both oral and general health personnel and disseminates standardized communication materials to raise public awareness.

Integration with National Health Programs[57]

One of the key strategies under the National Oral Health Programme is its convergence with existing national health initiatives to maximize outreach and resource utilization. As per the Ministry of Health and Family Welfare and the Press Information Bureau (2019), the NOHP is currently integrated with 11 national health programs under the broader National Health Mission (NHM) framework. These include:

1. Rashtriya Bal Swasthya Karyakram (RBSK): Screening of schoolchildren for oral conditions.
2. National Tobacco Control Programme (NTCP): Counselling and cessation support for tobacco-related oral diseases.
3. National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS): Common risk factor approach.
4. National Programme for Control of Fluorosis (NPPCF): Management of dental fluorosis.
5. National Programme for Health Care of the Elderly (NPHCE): Provision of prosthodontic and oral care for the elderly.
6. School Health Program under Ayushman Bharat: Oral health promotion and referrals.
7. Janani Shishu Suraksha Karyakram (JSSK): Integration for maternal oral health awareness.

8. National Mental Health Programme (NMHP): Addressing oral health among psychiatric patients.
9. Universal Immunisation Programme (UIP): Opportunity for early oral health interventions.
10. National Vector Borne Disease Control Programme (NVBDCP): Shared IEC/BCC platforms.
11. Mission Indradhanush: Inclusion of oral hygiene education in immunization outreach.
12. This multi-program convergence promotes holistic healthcare delivery and ensures that oral health is no longer addressed in isolation but as part of the larger public health ecosystem.

Utilisation of Financial Resources

Although the allocation under NOHP has steadily improved, expenditure trends reflect inconsistent utilisation. Data from 2019–2024 reveals that while Rs. 1832.75 lakh was allocated in 2021–22, actual expenditure reached Rs. 1016.21 lakh (55.5%). In contrast, the year 2023–24 witnessed significantly higher utilization at over 80% of allocated funds. This variability underscores the need for strengthening planning, fund disbursement, and monitoring mechanisms across states to ensure optimum use of available resources.[53]

Implementation Barriers[54–56]

Despite its robust framework, the NOHP faces multiple challenges that constrain its impact:

1. Low policy visibility: Oral health remains low on the public health agenda due to its non-life-threatening perception.
2. Human resource disparities: Most dentists practice in urban centres, leaving rural populations underserved.
3. Lack of policy convergence: Oral health has yet to be meaningfully integrated into fluorosis control, nutrition, or maternal-child health programs.
4. Absence of surveillance systems: There is no national database to track oral disease burden or program outcomes.
5. Limited academic reform: Dental curricula continue to emphasise treatment over prevention and social accountability.

Strategic Recommendations[55, 56]

Drawing from national evidence and global best practices, the following measures are essential for strengthening the NOHP:

1. Adopt a National Oral Health Policy to provide a legislative and strategic framework for future reforms.
2. Embed oral health in primary healthcare delivery via AB-HWCs and community platforms.
3. Revise dental education to include public health principles, prevention strategies, and rural service mandates.
4. Develop a centralized oral health surveillance system to guide planning and evaluation.
5. Leverage dental auxiliaries and existing frontline workers (e.g., ASHAs, Anganwadi Workers) for community-level interventions.
6. Encourage Public-Private Partnerships (PPP) with dental colleges, NGOs, and professional associations to enhance outreach.
7. Learn from international models like Brazil's "Smiling Brazil" program, which offers a rights-based approach to universal oral healthcare.

The National Oral Health Programme reflects a progressive shift toward inclusive and preventive oral healthcare in India. However, to realize its full potential, it must be supported by dedicated policy adoption, efficient fund utilization, intersectoral convergence, and robust monitoring systems. Oral health, being a critical component of general health, must be positioned alongside other national priorities to truly address the burden of preventable dental diseases and reduce oral health inequities in India.

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CHAPTER

10

National Health Programs- HOPE:IN

10.1 National Tuberculosis Elimination Program – Oral Tuberculosis: An overlooked Facet

Tuberculosis (TB) continues to pose a significant public health burden in India, which accounts for the highest number of TB cases globally. To combat this challenge, the Government of India has implemented the National Tuberculosis Elimination Program (NTEP) with a target to eliminate TB by 2025—five years ahead of the global End TB Strategy deadline set by the World Health Organization (WHO).[58]

Key Features of NTEP

The NTEP incorporates an advanced framework that emphasises universal drug susceptibility testing (DST), rapid diagnosis using nucleic acid amplification tests (NAATs), and the provision of shorter, fully oral treatment regimens for drug-resistant TB, such as the BPaLM and longer oral MDR regimens. The program is supported by digital platforms such as Ni-kshay, which allows real-time tracking of patients and outcomes, and also facilitates Direct Benefit Transfers (DBT) and nutritional support via the Pradhan Mantri TB Mukt Bharat Abhiyaan (PMTBMBA).

The guidelines also address treatment modifications and considerations for special populations, including pregnant women, children, and people living with HIV. They promote a patient-centric approach involving monthly follow-ups, digital adherence tools, and support for adverse drug reactions, all of which reflect a move toward personalized TB care within the national framework.[59]

Burden and Progress as per WHO 2023 Report

The WHO Global TB Report 2023 highlights that India contributed approximately 27% of the global burden of multidrug-resistant or rifampicin-resistant TB (MDR/RR-TB) in 2022. Despite a resurgence in case notifications following the pandemic, treatment success rates for drug-resistant TB remain below target. The report emphasises the urgent need for increased domestic financing, improved accountability at all levels,

and the incorporation of new vaccines and diagnostics under development to bridge existing gaps.[58]

A study conducted in Ahmedabad to evaluate patient satisfaction with NTEP services reported a high overall satisfaction rate of 86%, with 91.5% compliance to treatment. However, the study identified notable gaps in domains such as communication, accessibility, time with doctors, and grievance redressal mechanisms. Challenges such as delayed DBT payments and lack of compensation for income loss due to TB were key concerns. The authors recommended innovations including the appointment of programme ombudsmen, use of peer educator models, and legislative action to strengthen patient rights and improve accountability.[60]

Oral Tuberculosis: An Overlooked Facet

Although TB is primarily a pulmonary disease, it can manifest in the oral cavity, often mimicking more common lesions such as squamous cell carcinoma, chronic traumatic ulcers, or fungal infections. This diagnostic overlap frequently leads to delayed or missed diagnoses, especially when oral TB occurs as the primary and only manifestation of the disease without systemic involvement.

Oral TB lesions are commonly seen in sites such as the mandible, buccal mucosa, gingiva, lips, and tongue. A retrospective study of 25 biopsy-confirmed oral TB cases found that 48% occurred in the mandible, and the most frequent symptoms were swelling and ulceration. Histopathological examination typically reveals granulomas with epithelioid cells and Langerhans-type giant cells, while Ziehl–Neelsen staining confirms the presence of acid-fast bacilli.[61]

Scientific Evidence from Case Reports

A rare case report described primary tuberculosis involving both buccal and labial mucosa in a 38-year-old male patient who presented with non-healing oral ulcers. The lesion was initially suspected to be malignant but was later diagnosed through biopsy and Ziehl–Neelsen staining. The patient, with no history of pulmonary TB, responded well to standard Category I anti-TB therapy under NTEP, achieving complete lesion resolution in three months.

This case underscores the critical need for oral healthcare professionals to include TB in their differential diagnosis when examining chronic oral ulcers or swellings. Since many oral TB cases present in patients without prior systemic TB, dentists can serve as the first point of contact, enabling early diagnosis and prompt referral.[62]

Comparative Oral and Periodontal Status in TB Patients

Another observational study comparing oral and periodontal status among TB patients and healthy controls found that TB patients had significantly higher prevalence of gingival

inflammation, oral mucosal lesions, and halitosis. These changes were attributed to systemic illness, medication side effects, and compromised immunity, further supporting the argument for routine oral assessments as part of TB management.[63]

The Rationale for Integrating Oral Health with NTEP

The integration of oral health into the NTEP framework can yield multifold benefits. Early identification of atypical oral lesions by trained dental professionals can reduce diagnostic delays and improve treatment outcomes. Furthermore, leveraging existing digital systems like Ni-kshay to report and track suspected oral TB cases can enhance surveillance.[59, 61]

Establishing oral health screening points at primary health centres and including dentists in community awareness drives can strengthen public health infrastructure. Oral health practitioners can also assist in delivering TB-related health education, helping to destigmatise the disease and reinforce treatment adherence.[60, 62]

Policy-level integration should involve training modules for dentists on TB screening, the development of oral TB reporting protocols, and the inclusion of oral health data in national TB surveillance. This would not only support early detection of TB but also address the broader oral health needs of affected populations, aligning with universal health coverage goals.[61, 63]

The National Tuberculosis Elimination Program stands as a comprehensive, dynamic initiative aimed at eradicating TB in India by 2025. While the program has made substantial progress in diagnosis, treatment, and patient support, a critical gap persists in recognizing oral tuberculosis as a potential early indicator. Scientific evidence from retrospective studies, case reports, and community surveys clearly highlights the role of oral health professionals in TB detection and care. Bridging the divide between oral health and TB control through structural, policy, and surveillance-based integration can significantly enhance public health outcomes, reduce disease burden, and support India's goal of TB elimination.

10.2 Oral Health Integration into Reproductive, Maternal and Child Health Programs

India's Reproductive and Child Health (RCH) programs are foundational public health strategies aimed at improving maternal, newborn, child, and adolescent health outcomes. These programs, operating under the umbrella of the National Health Mission (NHM), have evolved to cover a continuum of care—from adolescence to motherhood and childhood—emphasising equity, access, and quality of services for all, especially among underserved populations.[64]

The RMNCH+A Strategy: A Continuum of Care

Launched in 2013, the Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCH+A) strategy provides a life-cycle-based framework that integrates various phases of care. It links community-based services with facility-level interventions to ensure seamless health support for women and children. The approach focuses on improving institutional deliveries, reducing maternal and neonatal mortality, enhancing antenatal and postnatal care, and promoting adolescent health through targeted interventions.[64, 65]

Janani Suraksha Yojana (JSY) and Janani Shishu Suraksha Karyakram (JSSK)

JSY, initiated in 2005, is a conditional cash transfer scheme aimed at reducing maternal and neonatal mortality by promoting institutional deliveries among poor pregnant women. JSSK, introduced in 2011, further strengthens this by providing free and cashless services to pregnant women and sick newborns, including diagnostics, C-section services, drugs, blood, and transport.[64, 66] Although no official integration of oral health services into JSY or JSSK currently exists, future policy advocacy points towards such possibilities, especially in maternal antenatal care.[67, 68]

Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA)

PMSMA, introduced in 2016, ensures free antenatal care on the 9th of every month across government health facilities. Its goal is to detect high-risk pregnancies early and facilitate their management. While PMSMA does not yet mandate dental check-ups, several studies have emphasised the need to integrate oral health assessment into antenatal care due to its proven links with pregnancy outcomes such as preterm birth and low birth weight.[69–71] Promoting dental visits during scheduled ANC days could significantly improve maternal and neonatal health.

Mission Indradhanush (MI) and Universal Immunisation Program (UIP)

MI and UIP aim to achieve universal immunisation for children and pregnant women, particularly in underserved areas. These platforms provide regular community engagement and outreach opportunities that can potentially be leveraged for oral health promotion. Although current policy does not include dental care, strategic proposals have recommended expanding the scope of such immunisation days to include basic oral health screening and counselling.[67, 68]

Rashtriya Bal Swasthya Karyakram (RBSK)

Among existing RCH initiatives, RBSK stands out as the most integrative for oral health. Launched in 2013, it targets children from birth to 18 years and provides screening for 4Ds: Defects at birth, Diseases, Deficiencies, and Developmental Delays. Dental caries, cleft lip/palate, and other oral conditions are explicitly included in its screening protocol. Mobile Health Teams conduct evaluations at schools and Anganwadis and refer affected children to District Early Intervention Centres (DEICs) for follow-up care, where dental services are increasingly being made available.[66, 72]

Adolescent Health Initiatives: Rashtriya Kishor Swasthya Karyakram (RKSK)

RKSK, launched in 2014, focuses on addressing adolescent health issues such as nutrition, sexual and reproductive health, mental health, and substance abuse. The program promotes peer education and counselling via Adolescent Friendly Health Clinics (AFHCs). Although oral health is not a formally embedded component, there is a growing policy-level acknowledgment that adolescence is a critical window for preventive oral care. Integration of oral health education into RKSK peer educator modules has been proposed as a scalable model.[73, 74]

Poshan Abhiyaan: Nutrition and Oral Health

Poshan Abhiyaan, India's flagship nutrition mission, tackles malnutrition among children, adolescent girls, and pregnant women. Given the interplay between malnutrition and oral health (e.g., enamel hypoplasia, delayed tooth eruption, oral mucosal lesions), experts recommend co-delivering dietary counselling and oral health education. This includes fluoride supplementation and improved feeding practices to prevent early childhood caries.[67, 75]

Global and State-Level Policy Advocacy for Integration

The World Federation of Public Health Associations (WFPHA) in its 2023 policy statement emphasised that oral health must be made a mandatory component of

maternal and child health systems by 2030. It advocates for embedding oral health into ANC and pediatric health programs through both training and service delivery pathways.[75] In India, Karnataka's Integrated Health Policy 2025 outlines a vision for universalising primary oral healthcare by embedding dental services across NHM verticals. It also calls for oral health surveillance and inter-sectoral convergence.[66, 73]

The IOHI Initiative and Evidence from India

The Maternal and Child Oral Health Integration Initiative (IOHI), although developed in the United States, serves as an international benchmark for how oral health can be systematically built into maternal and child health systems. Its objectives include oral health education for ANC providers, routine oral assessments during pregnancy, and inclusion of oral health indicators in maternal surveillance data.[74] Similar models have shown success in India where perinatal oral health programs demonstrated improved maternal hygiene practices and reduced gingival inflammation when oral care was integrated into existing community outreach.[71]

Challenges to Oral Health Integration in RCH

Despite these promising developments, numerous systemic barriers persist. Lack of awareness among pregnant women and healthcare providers regarding the safety and importance of dental treatment during pregnancy remains a significant hurdle. Additionally, the absence of formal cross-referral mechanisms between medical and dental services, compounded by shortages of trained dental professionals in rural areas, limits accessibility. Most national schemes like JSSK and UIP still operate in vertical silos without oral health linkage.[67, 69, 70]

Recommendations

To realise the vision of holistic RCH care, the following steps are recommended:

1. Mandate oral health screening during ANC days such as PMSMA.
2. Train frontline health workers (ASHAs, ANMs) in identifying basic oral conditions.
3. Embed dental check-ups within immunization and nutrition outreach days.
4. Strengthen DEICs under RBSK with dental infrastructure and human resources.
5. Digitally track oral health indicators through e-health tools as part of NHM dashboards.[66, 73, 75]

India's RCH programs have made commendable progress in improving maternal and child health outcomes. However, integrating oral health within these frameworks is

a critical and logical next step in ensuring comprehensive healthcare. Such integration will not only enhance oral health outcomes but also improve broader maternal and child health indicators—ultimately supporting India's goal of universal health coverage.

10.3 Oral Health as a Gateway to Early HIV Detection: Linkage with National AIDS and STD Control Program

The National AIDS Control Programme (NACP), initiated in 1992 and currently in its fifth phase, has played a pivotal role in curbing the HIV/AIDS epidemic in India. Operated by the National AIDS Control Organization (NACO), the programme emphasises prevention, early diagnosis, and free antiretroviral treatment (ART) across the country. Within this framework, the integration of oral health services has become increasingly important, considering that oral manifestations often serve as early indicators of HIV infection and disease progression. Moreover, maintaining optimal oral health significantly improves the nutritional status, psychosocial well-being, and overall quality of life among people living with HIV (PLHIV).[76]

Oral Manifestations of HIV and Their Diagnostic Importance

In the pre-ART era, up to 70% of individuals with HIV experienced oral lesions during the disease course. These included oral candidiasis, oral hairy leukoplakia, necrotising gingivitis, Kaposi's sarcoma, and other opportunistic infections. Such lesions were often the first clinical signs leading to HIV testing and diagnosis. Although the incidence has declined with the scale-up of ART, these oral conditions continue to serve as early indicators in individuals with undiagnosed or poorly controlled HIV.[77]

Recognising the diagnostic utility of oral lesions, NACP has collaborated with dental institutions to train dental professionals in identifying HIV-associated oral manifestations and referring suspected cases for confirmatory testing. These initiatives not only facilitate early detection and timely treatment but also position dental professionals as essential contributors to the public health response.[78]

Oral Healthcare Services for PLHIV

The Care, Support, and Treatment (CST) component of NACP encourages oral healthcare as a part of holistic management for PLHIV. In many ART centers, especially those linked to medical colleges, either in-house dental professionals are posted or formal referral linkages exist with nearby dental departments. These provisions enable timely management of common HIV-related oral conditions.[76, 79]

Oral Candidiasis

This is treated using antifungal agents like Nystatin or Clotrimazole, often dispensed at ART centers. Counselling is also provided on oral hygiene and preventive care to reduce recurrence.[77]

Periodontal Diseases

Conditions like Necrotising Ulcerative Gingivitis (NUG) and Periodontitis (NUP), commonly seen in immunosuppressed individuals, are promptly referred to dental units. Basic periodontal treatments and interim care (e.g., antiseptic rinses) are initiated at ART centers.[79]

Xerostomia

Dry mouth due to HIV drugs or salivary gland involvement is managed through patient education on hydration, fluoride use, and diet modifications. Dentists play a key role in preventing dental caries in such patients.[80]

Oral Cancer and Co-infections

HIV-positive individuals are at increased risk of HPV-related oral malignancies. ART centers are being encouraged to include opportunistic oral screening, particularly in tobacco users, along with linking patients to tobacco cessation services.[81]

Infection Control and Reducing Stigma in Dental Settings

Historically, stigma and fear among dental professionals led to reluctance in treating PLHIV. NACP addressed this by implementing strict infection control protocols—such as universal precautions, sterilisation practices, and use of protective barriers—which protect healthcare personnel regardless of patient serostatus. The passage of the HIV and AIDS (Prevention and Control) Act, 2017, further strengthened legal safeguards, making it unlawful to deny services, including dental care, to HIV-positive individuals.[76]

Awareness campaigns and continuing dental education (CDE) programs under NACP have improved provider attitudes, reduced stigma, and encouraged more PLHIV to seek routine dental care without fear of discrimination.[82]

Community-Based Integration of Oral Health and HIV Services

Through its targeted interventions (TIs) and information, education, and communication (IEC) campaigns, NACP has utilised community-based platforms to integrate oral health services. For instance, at HIV awareness and testing camps, dental professionals have been included to provide on-the-spot oral screening and hygiene demonstrations. Conversely, at dental outreach camps in underserved areas, HIV testing services are often made available by NACO-linked counsellors. This dual strategy ensures comprehensive care delivery at the point of contact and addresses two neglected health domains simultaneously.[79]

HIV, ART, and Long-Term Oral Health Outcomes

With over 2 million individuals currently receiving free ART in India, the incidence of opportunistic oral lesions has markedly decreased. Nevertheless, long-term ART and

chronic HIV infection can lead to new oral challenges, such as drug-induced mucosal pigmentation or immune reconstitution inflammatory syndrome (IRIS)–related lesions.

NACP encourages dental screening at the time of ART enrolment and includes oral health education in the Positive Health, Dignity, and Prevention (PHDP) framework. Peer support groups and patient education sessions often include dietary counselling, oral hygiene tips, and advice on habit cessation—ensuring a life-course approach to oral health among PLHIV.[81, 83]

Model Initiatives and Case Example

A successful integration model was implemented in Mumbai where a dental college partnered with NACO to offer priority care for HIV-positive individuals registered at ART centers. This not only alleviated oral pain and functional difficulties among PLHIV but also improved nutritional outcomes and treatment adherence, indicating a strong association between oral health and general health in HIV care. Similar collaborations are being piloted across India to replicate this success.[80]

The integration of oral health services into the National AIDS Control Programme (NACP) exemplifies a mature public health approach that recognises the interplay between systemic and oral health. Oral lesions serve both diagnostic and prognostic roles in HIV, while comprehensive dental care supports treatment adherence, nutrition, and quality of life. This model not only improves individual outcomes for PLHIV but also contributes to broader public health goals, such as reducing morbidity and promoting dignity in care. Learnings from this integration can serve as a template for incorporating oral health into other disease control programmes in India.

10.4 National Disease Monitoring: Integrating Oral health within Integrated Disease Surveillance Program

The Integrated Disease Surveillance Programme (IDSP), launched in 2004 by the Ministry of Health and Family Welfare (MoHFW), represents India's principal framework for tracking epidemic-prone diseases and initiating timely responses. Developed with technical and financial assistance from the World Bank, its initial focus was on communicable diseases of public health significance.

Over time, the programme's mandate expanded to include selected non-communicable diseases (NCDs) and conditions relevant to disaster preparedness, emerging infections, and environmental health.

IDSP operates through a three-tier decentralised system comprising the Central Surveillance Unit (CSU) in New Delhi, State Surveillance Units (SSUs) in each state and union territory, and District Surveillance Units (DSUs) that form the operational backbone of data collection and local action.

Data is gathered using three standardised formats—S (syndromic), P (presumptive), and L (laboratory-confirmed)—which enable surveillance at varying levels of diagnostic certainty. Supplementing these are event-based inputs, such as community reports and media monitoring, that help capture unanticipated health threats.[84–89]

Evolution to IHIP and Digital Strengthening

Recognising persistent delays and gaps in reporting, India initiated a digital transformation of IDSP through the Integrated Health Information Platform (IHIP). Launched nationally in April 2021 after phased pilots, IHIP allows real-time, geo-tagged, case-based reporting from the point of care. Field health workers such as Auxiliary Nurse Midwives (ANMs) use mobile-enabled applications (e.g., ANMOL tablets) to input disaggregated patient data, which is instantly visible to district, state, and national units. The integration of geographic information system (GIS) mapping, automated dashboards, and analytics has enhanced outbreak detection and response speed. This transition aligns with India's commitments under the International Health Regulations (IHR) for improved early-warning capacity and with the National Digital Health Mission vision for interoperable, citizen-centric health data.[84, 87–89]

Current Scope and Gaps

The IDSP/IHIP network currently covers more than 33 communicable diseases and conditions, including vector-borne, waterborne, and zoonotic diseases, as well as a limited set of NCD-related conditions such as certain cancers. However, oral health indicators are absent from both the mandatory and optional reporting lists.

This omission persists despite well-documented associations between oral conditions and systemic diseases, such as the bidirectional relationship between periodontitis and diabetes, the role of tobacco in oral and systemic cancers, and the occurrence of oral manifestations in infections like tuberculosis and HIV/AIDS. The absence of oral health data in national surveillance constrains early detection, prevention, and targeted intervention efforts.[85, 86, 90, 91]

Policy Imperatives for Expansion

The Vision 2035: Public Health Surveillance in India white paper from NITI Aayog articulates a shift toward integrated, predictive, and responsive surveillance systems that encompass both communicable and non-communicable diseases. The framework explicitly promotes the use of interoperable digital platforms, integration of plant–animal–human health data under a One Health approach, and expansion of disease monitoring to include broader determinants and conditions. Although oral health is not explicitly listed, the expansion of NCD surveillance creates a policy opening for its inclusion. Leveraging IHIP's architecture for oral health data would align with the National Oral Health Policy objectives and contribute to the National Health Mission's goal of comprehensive primary healthcare.[90, 91]

Technical Feasibility and Design Considerations

Integration of oral health into IDSP/IHIP is technically feasible, provided it follows a structured design. At the community level, frontline health workers could collect minimal indicators such as:

1. Oral ulcer persisting for more than two weeks.
2. Visible oral mucosal lesions suggestive of potentially malignant disorders (OPMDs).
3. Visible dental fluorosis.
4. Oral pain affecting function.
5. Self-reported tobacco and/or alcohol use.

At the facility level, dental professionals or medical officers could record:

1. Basic dental caries indices (DMFT/DT).
2. Periodontal status using Community Periodontal Index (CPI) screening categories.
3. Type of suspected OPMD.
4. Suspected oral cancer cases.
5. Fluorosis grade.
6. Referral and biopsy status.

Laboratory-confirmed cases (e.g., histopathology for oral cancer) could be integrated into IHIP's L-form reporting. Event-based surveillance could capture unusual clusters, such as multiple fluorosis cases in a village or sudden increases in mucosal lesions linked to environmental exposures.[84, 85, 88, 90]

Potential Public Health Gains

Integrating oral health surveillance within IDSP/IHIP offers multiple benefits:

1. Early warning of systemic disease: Oral lesions may signal underlying HIV infection, tuberculosis, or uncontrolled diabetes.
2. Targeted cancer prevention: Mapping of OPMDs and oral cancers could identify high-burden districts for intensified tobacco cessation and screening programmes.
3. Environmental hazard detection: Linking fluorosis data to NPPCF and water quality monitoring could guide corrective measures.
4. Pandemic preparedness: COVID-19-associated mucormycosis highlighted the importance of capturing oral and maxillofacial manifestations during health crises.
5. Cross-programme synergies: Aligning with NTEP, NACP, NPPCF, and NOHP would promote efficient resource use and integrated patient care pathways.[87, 90, 91]

Implementation Roadmap

A phased approach is recommended:

Phase 1 (Pilot)

Select 2–3 states with functional dental public health infrastructure; develop case definitions, reporting templates, and training modules; integrate oral health fields into IHIP test environment.

Phase 2 (Scale-up)

Expand to additional states; introduce oral health dashboards; conduct periodic data quality audits; refine thresholds for triggering investigation.

Phase 3 (Nationwide Roll-out)

Institutionalise oral health surveillance as part of IDSP's core functions; secure financing through NHM and NOHP; establish continuous training and feedback loops.

This roadmap aligns with existing IDSP capacity-building models and the broader shift towards comprehensive, citizen-centric public health surveillance envisioned in national policy.[84, 87–91]

10.5 National Programme for Control and Treatment of Occupational Diseases: Expanding the Scope to Include Dental Occupational Health

Occupational diseases constitute a significant public health concern in India, arising from exposure to hazards in diverse industries such as mining, construction, manufacturing, agriculture, and healthcare. Workers face risks from dust, chemicals, radiation, ergonomic strain, noise, and biological agents, which can culminate in chronic illnesses like pneumoconiosis, asbestosis, silicosis, occupational cancers, heavy metal poisoning, and musculoskeletal disorders. In recognition of the growing burden, the Government of India launched the National Programme for Control and Treatment of Occupational Diseases (NPCTOD), aimed at prevention, early detection, diagnosis, treatment, and rehabilitation of affected workers, thereby ensuring a safe and healthy work environment.[92–94]

Objectives of NPCTOD

The NPCTOD seeks to reduce occupational health risks through a multipronged approach:

1. Early detection and prevention of occupational diseases through workplace surveillance and medical screening.
2. Implementation of workplace safety regulations to limit exposure to hazardous agents.
3. Treatment and rehabilitation of workers diagnosed with occupational illnesses.
4. Health education and awareness campaigns targeting both employees and employers.
5. Capacity building of healthcare professionals to recognise, diagnose, and manage occupational health conditions.[93, 94]

Legal and Institutional Framework

The programme operates within a broader legal context that includes the Factories Act (1948) and Mines Act (1952), both of which mandate occupational health and safety standards, pre-employment health checks, and periodic medical examinations for hazardous occupations. Oversight and technical support are provided by institutions such as the National Institute of Occupational Health (NIOH), a WHO Collaborating Centre established in 1970 with regional centres in Bangalore and Kolkata; the Directorate General of Mines Safety (DGMS); and the Directorate General – Factory

Advisory Services and Labour Institutes (DGFASLI). The National Safety Council of India (NSCI) further supplements these efforts by promoting safety culture and training initiatives.[94]

Despite these measures, occupational diseases remain underreported, especially in the unorganised sector, due to limited awareness, inadequate enforcement of regulations, and insufficient trained manpower in occupational health.[94, 95] The absence of a national occupational disease registry hampers the systematic collection of incidence and exposure data, limiting the ability to design targeted interventions.[95]

Burden of Occupational Diseases in India

Epidemiological data from NIOH and related agencies highlight the scale of the problem. In mining communities, pneumoconiotic opacities in chest radiographs have been reported in 5.3–13% of open-cast workers, with confirmed silicosis cases in stone miners. Noise-induced hearing loss affects up to 75% of underground miners, while operators of heavy earth-moving machinery frequently report musculoskeletal pain due to whole-body vibration exposure. Other common occupational conditions include pesticide poisoning among agricultural workers, mercury and arsenic toxicity in industrial sectors, and various occupational cancers linked to chemical exposures.[92, 94]

Relevance to Dentistry and Oral Health

While dentistry is not traditionally categorised under heavy industry, it is an occupation with considerable exposure to physical, chemical, biological, and ergonomic hazards, making the principles of NPCTOD highly applicable.[87, 88]

Musculoskeletal Disorders

Indian studies have documented high prevalence of musculoskeletal disorders (MSDs) among dental professionals, ranging from 63% to over 90%. Commonly affected areas include the neck, lower back, shoulders, wrists, and hands, with risk factors such as prolonged static posture, repetitive movements, and inadequate ergonomic support. Ergonomic guidelines, if integrated into NPCTOD frameworks, could reduce this burden.[96]

Biological Hazards and Infection Control

Dentists face significant exposure to infectious agents through blood, saliva, and aerosols generated during clinical procedures. A study on bacterial aerosols in dental clinics reported substantial increases in colony-forming units during treatment sessions, with organisms such as Staphylococcus epidermidis, Micrococcus, and diphtheroid detected in high concentrations. Recommendations include the use of personal

protective equipment (PPE), pre-procedural mouth rinses, high-volume suction, and improved ventilation—aligning with NPCTOD's preventive ethos.[87]

Needle Stick Injuries (NSIs)

Needlestick injuries are a common hazard, particularly among dental students and early-career practitioners. While knowledge about NSI risks and post-exposure prophylaxis (PEP) is generally high, safe disposal practices remain inconsistent, with only a minority using puncture-resistant containers or needle destroyers. NPCTOD's surveillance and reporting mechanisms could be adapted to ensure timely PEP initiation and prevention training in dental settings.[97]

Chemical and Allergic Hazards

Dental practice involves exposure to mercury from amalgam restorations, acrylic resins, disinfectants, and other chemicals. Poor amalgam waste disposal practices and limited use of radiation dosimetry monitoring have been reported.[98, 99] Allergic reactions, particularly latex hypersensitivity, are another recognised occupational risk, with studies showing that over 80% of glove-related allergic reactions in Indian dentists are linked to latex gloves. Alternatives such as powder-free latex or nitrile gloves can reduce this risk.[100]

Radiation Hazards

Dental radiography, although involving relatively low doses, still requires adherence to protective protocols to prevent stochastic effects of ionising radiation. Indian surveys have revealed gaps in the use of lead aprons, thyroid collars, and dosimetry badges, despite generally positive attitudes towards radiation safety.[98] Integrating radiation protection training into NPCTOD's capacity-building initiatives could address these deficiencies.

Challenges in NPCTOD Implementation

Barriers to effective implementation include:

1. Limited infrastructure for occupational disease surveillance in small-scale and informal sectors.
2. Low awareness among both workers and employers.
3. Shortage of trained occupational health specialists in public healthcare.
4. Inconsistent enforcement of laws and regulations.[93, 94]

Recommendations for Strengthening NPCTOD and Dental Integration

1. Expand occupational disease surveillance to include healthcare and dental sectors.

2. Integrate occupational health services into primary care, ensuring accessibility for informal workers and small clinics.
3. Develop sector-specific safety protocols, including ergonomic guidelines, infection control measures, radiation protection, and chemical handling in dental practice.
4. Strengthen workplace safety inspections and compliance monitoring.
5. Provide financial assistance and compensation for affected workers, including self-employed practitioners.
6. Establish a national occupational disease registry for accurate incidence tracking and preventive planning.[93–95]

The NPCTOD plays a critical role in safeguarding worker health across India's diverse occupational landscape. Its principles of prevention, surveillance, hazard control, and rehabilitation are equally relevant to dentistry, a profession that faces significant ergonomic, biological, chemical, and radiation risks. Integrating dental occupational health into NPCTOD's framework could not only reduce morbidity among oral healthcare workers but also enhance productivity and service quality, ultimately contributing to broader public health goals.

10.6 National Nutrition Programmes and National Oral Health Programme (NOHP): Integration for Public Health

Malnutrition remains one of the most pressing public health challenges in India, impacting maternal health, child growth, cognitive development, and susceptibility to infectious and non-communicable diseases. Recognising its multifactorial origins—including inadequate dietary intake, poor feeding practices, micronutrient deficiencies, and socio-economic disparities—the Government of India has implemented a suite of targeted nutrition programmes under the National Health Mission (NHM) and Ministry of Women and Child Development (MoWCD). These initiatives aim to reduce stunting, wasting, anemia, and low birth weight, while promoting food security, dietary diversity, and healthy behaviours across the life course. Integration of these nutrition services with the National Oral Health Programme (NOHP) offers a strategic opportunity to address the shared risk factors and bi-directional relationship between diet and oral health.[101]

Integrated Child Development Services (ICDS) Scheme

Launched in 1975, ICDS is the largest community-based nutrition programme in India, targeting children under six years of age, pregnant women, and lactating mothers. Delivered primarily through Anganwadi Centres (AWCs), it provides supplementary nutrition, health check-ups, immunization, referral services, pre-school education, and nutrition and health education. The ICDS platform has proven effective for large-scale health outreach but faces challenges such as infrastructure gaps, staff shortages, and inconsistencies in service quality. The programme's established network and household-level engagement position it as a strong vehicle for embedding oral health promotion into existing nutrition education and dietary counselling activities.[102, 103]

Poshan Abhiyaan (National Nutrition Mission)

Launched in 2018, Poshan Abhiyaan adopts a multi-sectoral approach to tackle malnutrition through convergence of schemes including ICDS, Pradhan Mantri Matru Vandana Yojana (PMMVY), National Health Mission (NHM), Public Distribution System (PDS), and Swachh Bharat Mission. It emphasises the first 1,000 days of life, behavioural change through Jan Andolan (people's movement), and real-time monitoring via ICDS-CAS (Common Application Software). Its focus on cross-sectoral action and community mobilization provides an enabling framework for integrating oral health messaging—such as sugar intake reduction, promotion of breastfeeding, and calcium-rich diets—into the broader nutrition agenda.[104–106]

Mid-Day Meal Scheme/PM-POSHAN

Introduced in 1995 and now subsumed under PM-POSHAN, this programme provides hot cooked meals to children in government and government-aided schools. Beyond addressing classroom hunger, it supports improved school attendance and learning outcomes. Nutritionally balanced menus, often fortified with essential micronutrients, present opportunities for concurrent oral health promotion in school settings—such as educating children about the effects of frequent sugar consumption and the benefits of fruits, vegetables, and water over sugary snacks.[107]

National Food Security Act (NFSA)

Implemented in 2013, the NFSA guarantees subsidised food grains to a majority of the population via the Public Distribution System, with special provisions for pregnant women and lactating mothers. While NFSA primarily addresses calorie sufficiency, its food security framework could integrate oral health-sensitive nutrition messages, such as the importance of dietary fibre, reduction of refined carbohydrates, and safe drinking water for prevention of dental fluorosis.[104]

Pradhan Mantri Matru Vandana Yojana (PMMVY)

This conditional cash transfer scheme supports improved maternal nutrition and promotes institutional deliveries. By linking PMMVY counselling sessions to oral health education—particularly on the role of maternal diet in the child's tooth development and prevention of early childhood caries—both maternal and infant outcomes could be enhanced.[102, 105]

Rashtriya Bal Swasthya Karyakram (RBSK)

Launched in 2013, RBSK screens children from birth to 18 years for a spectrum of health conditions, including nutritional deficiencies and developmental disorders. Integrating oral health assessment within these screenings could facilitate early detection of enamel hypoplasia, caries, and gum disease linked to poor nutrition.[102]

Anaemia Mukt Bharat (AMB)

Initiated in 2018, AMB aims to reduce iron-deficiency anemia through iron-folic acid supplementation, deworming, behaviour change communication, and strengthened service delivery. Given the oral manifestations of anemia—such as glossitis, angular cheilitis, and recurrent aphthous ulcers—AMB's awareness campaigns could incorporate simple oral examination and guidance on oral hygiene in anaemic individuals.[101, 102]

Eat Right India Movement

A Food Safety and Standards Authority of India (FSSAI) initiative launched in 2018, this campaign encourages safe, healthy, and sustainable diets. With its mass media reach and focus on reducing salt, sugar, and trans fats, the movement's communication channels could be used to promote oral health literacy in the context of dietary practices.[101]

Linkages Between Nutrition and Oral Health

Scientific evidence underscores the reciprocal relationship between nutrition and oral health. Diets high in fermentable carbohydrates increase caries risk, while poor oral health limits the ability to consume nutrient-rich foods, thereby contributing to malnutrition. Micronutrient deficiencies, such as calcium and vitamin D, impair tooth mineralization, while iron deficiency is linked to mucosal changes and reduced resistance to infections. National nutrition programmes already addressing these dietary risk factors offer a logical entry point for oral health integration, using common risk factor approaches to address both domains simultaneously.[101, 102, 107]

Integration Opportunities within the National Oral Health Programme

The National Oral Health Programme (NOHP), under MoHFW, advocates for preventive oral health services at the primary care level. Leveraging nutrition programme infrastructure—particularly ICDS, Poshan Abhiyaan, and school health initiatives—could amplify outreach. Training frontline workers (ASHA, ANM, Anganwadi workers) to deliver basic oral health messages during nutrition counselling, incorporating oral examination in routine health checks, and using programme-based community events for oral health demonstrations are key strategies for integration.[102, 107]

Challenges in Integration

Despite the synergy, several barriers must be addressed to achieve effective integration:

1. Resource constraints in both oral health and nutrition programmes, including staff shortages and inadequate infrastructure.[103, 105]
2. Limited awareness among programme staff about the oral health implications of nutrition and vice versa.(106)
3. Fragmented inter-sectoral coordination between MoHFW, MoWCD, and education sectors.(105)
4. Behavioural and cultural factors influencing diet and oral hygiene practices, which require tailored community engagement approaches.[101]

Recommendations

To strengthen the linkage between national nutrition and oral health programmes:

1. Embed oral health messages into all nutrition-related IEC (Information, Education, Communication) materials.
2. Train nutrition programme staff in basic oral health promotion and screening.
3. Use nutrition surveillance systems, such as ICDS-CAS, to include oral health indicators.
4. Pilot joint service delivery models in selected districts, integrating NOHP services into nutrition programme outreach.
5. Mobilise community platforms like Jan Andolan to promote both healthy diets and oral hygiene practices.[101, 102, 105, 107]

10.7 National program for Control of Blindness and Visual Impairment Oral Health: Towards Comprehensive NCD Prevention

The National Programme for Control of Blindness (NPCB) was launched in 1976 by the Ministry of Health and Family Welfare (MoHFW), Government of India, as a 100% centrally sponsored initiative to address the significant public health burden of avoidable blindness. At the time of its inception, India carried one of the highest blindness prevalence rates globally, with estimates suggesting that up to 80–90% of blindness was preventable or curable. Initially, the programme focused primarily on cataract—the leading cause of blindness in the country—through surgical interventions and mass outreach.

Over subsequent decades, it evolved into the National Programme for Control of Blindness and Visual Impairment (NPCBVI), widening its scope to include refractive errors, corneal blindness, diabetic retinopathy, glaucoma, childhood blindness, retinopathy of prematurity (ROP), posterior segment disorders, ocular trauma, and low vision services. Structural reforms included the establishment of District Blindness Control Societies (DBCS) to coordinate activities locally, integration with State and District Health Societies under the National Health Mission (NHM), and strategic partnerships with NGOs and private providers through public–private partnership (PPP) models. Public awareness drives such as the annual Eye Donation Fortnight have been central to encouraging corneal donation and strengthening eye banking systems.[108]

Programme Objectives and Strategic Targets

NPCBVI's primary goal is to reduce the prevalence of blindness to 0.3% by 2025, in alignment with the global Vision 2020 initiative. To achieve this, the programme focuses on strengthening universal access to comprehensive eye care services at primary, secondary, and tertiary levels, while ensuring equity across rural and urban populations. Specific objectives include expanding school eye screening programmes to detect and manage refractive errors early, increasing public awareness and access to corneal transplantation, addressing priority ocular conditions such as diabetic retinopathy (DR), glaucoma, and age-related macular degeneration (AMD), and enhancing human resource capacity through targeted training of ophthalmologists, optometrists, ophthalmic assistants, and community health workers. The programme also seeks to embed eye care services within Ayushman Bharat Health and Wellness Centres (HWCs) to ensure continuity of care.[109]

Infrastructure and Service Delivery Framework

The NPCBVI operates through a hub-and-spoke model linking Vision Centres at primary health facilities to secondary-level district hospitals and tertiary Centres of Excellence at medical colleges and specialised eye institutions. Vision Centres, staffed by trained ophthalmic assistants or optometrists, conduct primary-level screenings, basic treatments, and referrals. District Blindness Control Societies oversee service delivery, coordinate mobile ophthalmic units in underserved areas, and facilitate public awareness activities. Teleophthalmology has emerged as a key innovation for DR and glaucoma screening, enabling remote image grading and specialist consultations. The operational guidelines emphasise the integration of comprehensive eye care packages within the NHM framework, capacity-building of schoolteachers and ASHAs for preliminary vision screening, and strengthening referral linkages between health system tiers.[110, 111]

School Eye Screening and Paediatric Eye Care

School Eye Screening (SES), introduced in 1994, targets early detection of refractive errors and amblyopia among schoolchildren. Trained teachers and community health workers conduct preliminary screenings, after which optometrists or ophthalmologists confirm diagnoses and provide appropriate management, including free spectacles for children from disadvantaged backgrounds. The SES model also serves as an opportunity to integrate oral health screening since dental caries and refractive errors share common determinants such as poor nutrition and inadequate hygiene. Combining oral and ocular health checks in schools can optimise resources, reduce missed school days, and promote holistic child health.[112, 113]

Integration with Non-Communicable Disease (NCD) Platforms

In recent years, NPCBVI has aligned with the National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD) to enable opportunistic and population-based screening. At the primary level, NP-NCD services include screening for hypertension, diabetes, and common cancers (oral, cervical, breast), alongside diabetic retinopathy assessments. Operational guidelines for DR management advocate opportunistic screening for all individuals with diabetes at NCD clinics, supported by teleophthalmology for retinal image interpretation. Given the well-documented bidirectional association between periodontal disease and diabetes, integrating oral examinations into DR screening protocols is a logical extension that could improve outcomes for both ocular and oral health.[114–116]

Oral–Ocular Health Linkages and Shared Risk Factors

There is increasing scientific evidence for interconnected pathways between oral and ocular health:

1. Periodontal disease and diabetic retinopathy: Chronic inflammation from periodontitis can worsen glycaemic control and microvascular health, thereby increasing DR risk and severity.[114]
2. Bidirectional diabetes–periodontitis relationship: Meta-analyses confirm that periodontitis increases the risk of developing diabetes by 26%, and diabetes increases the risk of periodontitis by 24%.[116]
3. Smoking: Smoking significantly raises the risk of cataracts, primary open-angle glaucoma, and AMD, while also being a leading cause of periodontal disease and oral cancer. This underscores the potential for coordinated anti-tobacco campaigns under NPCBVI and the National Tobacco Control Programme (NTCP).[116, 117]
4. Nutritional deficiencies: Vitamin A deficiency leads to xerophthalmia and enamel hypoplasia; vitamin B12 deficiency contributes to angular cheilitis and optic neuropathy; vitamin D deficiency is linked to both caries and certain ocular disorders.[118] These shared risk factors can be addressed through integrated nutrition counselling.
5. Glaucoma associations: While recent UK Biobank data found no direct causal link between oral disease and glaucoma, earlier cohort studies suggested possible inflammatory or vascular connections.[110]

Special Focus: Corneal Blindness and Eye Banking

Corneal blindness is a major cause of visual impairment in India. NPCBVI supports a network of eye banks, corneal transplant services, and public awareness initiatives such as Eye Donation Fortnight. Beyond surgical and technical capacity, community engagement is vital to increase eye donation rates. Oral health teams, particularly those engaged in community dental outreach, could reinforce eye donation messages alongside oral hygiene promotion, creating a shared preventive health narrative.[108, 110]

Challenges in Implementation

Despite considerable progress, NPCBVI continues to face challenges:

1. Significant rural–urban disparities in access to ophthalmic specialists.
2. Limited public awareness about eye donation and corneal transplantation.
3. Persisting high out-of-pocket costs in private sector facilities.

4. Missed opportunities to integrate oral health into NCD and school screening platforms.
5. Workforce shortages, especially in remote and tribal regions.[109, 112, 115]

Opportunities for Oral Health Integration

Several opportunities can strengthen the NPCBVI's public health impact through integration with oral health:

1. Including basic oral examinations in Vision Centre protocols.
2. Deploying dentists and dental hygienists in DR and glaucoma screening camps.
3. Adding oral health modules to school eye screening initiatives.
4. Developing unified IEC campaigns linking oral health, tobacco control, nutrition, and vision protection.
5. Leveraging telehealth platforms for dual oral and ocular consultations in underserved areas.[115, 116]

Over nearly five decades, the NPCBVI has transformed the landscape of eye care in India, significantly reducing the burden of avoidable blindness. The convergence of risk factors such as diabetes, tobacco use, and poor nutrition presents a compelling rationale for integrating oral health services within the NPCBVI framework. Joint screening, combined health education, and multidisciplinary collaboration between ophthalmologists, dentists, general physicians, and community health workers can amplify the programme's effectiveness and contribute to a more holistic, preventive approach to public health.[114–116]

10.8 National Iodine Deficiency Program: Oral Health Perspective

Iodine is an essential micronutrient necessary for thyroid hormone synthesis, which plays a central role in regulating growth, metabolism, and cognitive development. Deficiency of iodine results in a broad spectrum of iodine deficiency disorders (IDDs), including goiter, hypothyroidism, cretinism, impaired cognitive function, and other systemic complications. In India, endemic goiter was recognised as a significant public health issue in the early 20th century, prompting the establishment of the National Goitre Control Programme in 1962, which was restructured in 1992 as the National Iodine Deficiency Disorders Control Programme (NIDDCP) to address the wider range of IDDs beyond goiter.[119, 120]

Policy Framework and Governance

The NIDDCP is implemented under the Ministry of Health and Family Welfare (MoHFW) through the Directorate General of Health Services (DGHS), with coordination from state IDD cells, the Salt Commissionerate, the Food Safety and Standards Authority of India (FSSAI), and development partners such as UNICEF and the Iodine Global Network (IGN). The programme operates within a policy framework that mandates universal salt iodisation (USI) as per the Food Safety and Standards Act (2006), supported by national and state coordination committees and guided by WHO/UNICEF/IGN criteria for sustainable elimination of IDDs.[119, 121, 122]

Programme Objectives

Key objectives of the NIDDCP include: reducing IDD prevalence to less than 5% in the population; achieving universal consumption of adequately iodized salt (≥15 ppm at household level); conducting district-level surveys to assess IDD prevalence in school-aged children; repeating surveys every five years; monitoring iodine content in salt and urinary iodine excretion (UIE); and implementing targeted information, education, and communication (IEC) campaigns.[119–121]

Core Components of NIDDCP

Universal Salt Iodisation (USI)

USI is the primary strategy for IDD prevention. FSSAI regulations specify iodine levels of 20–30 ppm at the production stage and 15–30 ppm at retail. The Salt Commissionerate ensures compliance by working with the salt industry to standardise production, storage, and packaging to maintain iodine stability.[119, 121, 122]

Surveillance and Monitoring

Surveillance activities include periodic IDD surveys and testing of salt samples at production, wholesale, and retail points. Median UIE levels in school-aged children

serve as the primary biomarker for population iodine status, while goiter prevalence surveys provide epidemiological evidence of programme impact. WHO recommends maintaining UIE between 100–299 µg/L and goitre prevalence below 5% to sustain elimination.[121, 123]

Public Awareness and Behaviour Change Communication

Public awareness strategies employ mass media campaigns, community outreach, and school health education to promote exclusive use of iodized salt and to dispel myths regarding its consumption. Integration with existing nutrition and maternal health initiatives further amplifies reach.[119, 121]

Laboratory Network and Quality Assurance

A national laboratory network, supported by state laboratories, conducts salt iodine content analysis and UIE testing. Quality assurance is maintained through standardised titration methods and adherence to FSSAI protocols to ensure accurate monitoring and reporting.[119, 122]

Current Status in India

According to the India Iodine Survey (2018–19), 76.3% of households consume adequately iodized salt, though inter-state variations persist. NFHS-5 (2019–21) indicates that over 94% of households use iodised salt, yet adequacy gaps remain in remote and tribal populations. Factors such as geographic location of production, storage conditions, and supply chain efficiency contribute to disparities.[120, 121, 124]

Health Implications of Iodine Deficiency

Iodine deficiency during pregnancy can lead to maternal and foetal hypothyroidism, which is associated with irreversible brain damage, growth retardation, and neurodevelopmental impairments. In children, iodine deficiency is linked to reduced cognitive performance and decreased IQ, while in adults it affects work productivity and metabolic health. Severe deficiency results in conditions such as endemic goitre and cretinism, whereas even mild-to-moderate deficiency may impair neurological development.[120, 125, 126]

Oral Health Implications of Iodine Deficiency

Thyroid hormones influence craniofacial development, tooth eruption, and enamel mineralisation. Iodine deficiency, through hypothyroidism, can cause delayed tooth eruption, enamel hypoplasia, malocclusion, and macroglossia. Enamel hypoplasia has been shown to increase susceptibility to dental caries, with longitudinal data demonstrating a higher incidence of caries in hypoplastic teeth. Additionally, hypothyroidism is associated with xerostomia, altered salivary composition, and increased risk of periodontal disease.[127, 128]

Implementation Challenges

Challenges in NIDDCP implementation include variability in iodine content due to improper storage and transportation, especially in humid climates; inadequate quality control among small-scale salt producers; persistent inequities in access for remote populations; and limited enforcement of fortification regulations. Strengthened monitoring, improved supply chain management, and targeted interventions for underserved regions are needed.[120, 121, 124]

Opportunities for Integration with Oral Health Promotion

NIDDCP provides opportunities to integrate oral health education into existing IEC campaigns, particularly in school and community programmes. Dental professionals can be trained to identify oral manifestations of iodine deficiency and refer for medical evaluation. Joint outreach between dental and medical services could enhance early detection and holistic management of IDDs.[127, 128]

Recommendations

Future strategies should include expanding community outreach to high-risk populations, enforcing packaging and storage standards, upgrading laboratory capacity, and integrating NIDDCP with maternal and child health programmes and school health initiatives. Embedding oral health messaging within IDD prevention campaigns could improve both systemic and oral health outcomes.[119, 122, 127, 128]

10.9 From Mind to Mouth: National Mental Health Programme and Oral Health

Mental health is an essential component of holistic well-being, yet it remains underdiagnosed and undertreated in many parts of India. Recognising the significant burden posed by mental disorders, the Government of India launched the National Mental Health Programme (NMHP) in 1982 with the objective of ensuring accessible, affordable, and comprehensive mental healthcare for all, particularly underserved populations.

The NMHP was conceptualised to integrate mental health within general healthcare, encourage community participation, and reduce stigma through awareness and education initiatives. Over four decades, the programme has evolved to include community-based care, specialised training, and digital mental health services, with the District Mental Health Programme (DMHP) serving as its primary operational arm at the grassroots level.[129, 130]

Objectives and Core Components of NMHP

The NMHP's foundational objectives include strengthening community-based services, ensuring availability of trained mental health professionals at the primary care level, promoting early detection and treatment of mental disorders, and integrating mental health into broader non-communicable disease (NCD) frameworks.

Major components are:

1. District Mental Health Programme (DMHP): Established in 1996 following the Bellary Model pilot, DMHP delivers decentralised psychiatric care, public awareness programmes, and training for healthcare workers at the district level.[129]
2. National Tele-Mental Health Programme (Tele-MANAS): Launched in 2022 under the Ayushman Bharat Digital Mission, this initiative offers 24×7 multilingual tele-mental health counselling and specialist referrals via a tiered call-centre network.[131]
3. Manpower Development: Focus on increasing psychiatry, clinical psychology, psychiatric nursing, and social work training seats.
4. Mental Healthcare Act, 2017: Establishes legal rights for persons with mental illness, ensures informed consent, and mandates Mental Health Review Boards (MHRBs) for oversight.[132]

These components are reinforced by state–centre cost-sharing (60:40) and aim for convergence with primary healthcare to bridge India's mental health treatment gap.[129, 132]

Mental Health Disorders and Oral Health Implications

A growing body of evidence demonstrates a bidirectional relationship between mental health disorders and oral health status. Psychiatric conditions such as depression, anxiety, schizophrenia, bipolar disorder, autism spectrum disorder, and eating disorders influence oral health through behavioural, biological, and pharmacological pathways. Common mechanisms include:

1. Neglect of oral hygiene due to reduced motivation or cognitive impairment. [124,125].
2. Dietary changes such as high sugar intake during depressive episodes or sensory-driven preferences in autism.[133, 134]
3. Medication-induced xerostomia from antipsychotics, antidepressants, or mood stabilisers, leading to caries, mucosal discomfort, and periodontal risk.[133, 135]
4. Behavioural manifestations like bruxism, temporomandibular disorders, and aggressive brushing during manic phases.[133]

Conversely, poor oral health can exacerbate psychological distress through chronic pain, halitosis, altered aesthetics, and social withdrawal, creating a feedback loop of declining health [5, 9].[136]

Specific Mental Health Conditions and Oral Health Links

Depression and Anxiety: Meta-analysis shows higher DMFT/DMFS scores and increased tooth loss odds (OR 1.22) in affected individuals, though periodontal associations are inconsistent.[135]

Schizophrenia: Associated with poor oral hygiene, high caries rates, and xerostomia due to antipsychotic use; cognitive deficits impair care routines.[133]

Bipolar Disorder: Oral care patterns fluctuate with mood episodes; manic overbrushing can damage tissues, while depressive neglect increases plaque and disease burden.[133]

Autism Spectrum Disorder (ASD): Sensory sensitivities hinder toothbrushing and flossing; dietary selectivity increases caries risk.[133]

Eating Disorders: Bulimia and anorexia nervosa are strongly linked to dental erosion, reduced salivary flow, and mucosal changes due to acid exposure and malnutrition.[134]

Opportunities for Integration of Oral Health within NMHP

Although current NMHP operational guidelines do not explicitly integrate the National Oral Health Programme (NOHP), evidence-based synergies are compelling:

1. Routine oral screening: Incorporating oral health checks in DMHP and Tele-MANAS service protocols.

2. Cross-training: Educating mental health professionals to identify oral disease signs (e.g., erosion in eating disorders, medication-induced xerostomia).
3. Co-location models: Deploying dental professionals in psychiatric units and mental health-trained dentists in primary healthcare.[136]
4. Integrated IEC campaigns: Joint public awareness initiatives addressing stigma around both mental and oral health.
5. NCD clinics as convergence points: Using existing NCD infrastructure to deliver combined oral–mental health preventive services.[129, 133, 136]

Challenges in Implementation

1. Limited oral health workforce within mental health settings.
2. Stigma surrounding both mental illness and oral conditions.
3. Budgetary constraints and competing priorities within NMHP funding.
4. Lack of formal inter-programme policy linking NOHP with NMHP.[129, 130]

Recommendations

1. Policy inclusion: Amend NMHP guidelines to formally integrate NOHP interventions.
2. Tele-mental health linkages: Add dental e-referral systems within Tele-MANAS workflows.
3. Capacity building: Train DMHP staff on oral health basics; train dentists on psychiatric patient management.
4. Research and surveillance: Include oral health indicators in NMHP monitoring systems to generate integration evidence.

By aligning NMHP and NOHP, India could address two major yet interconnected public health challenges, improving both quality of life and long-term health outcomes for millions.[133, 136]

10.10 Expanding the National Programme for Prevention and Control of Non-Communicable Diseases: Linking Oral Health with Comprehensive NCD Care

Noncommunicable diseases remain India's dominant cause of morbidity and mortality, with metabolic and environmental risks driving a large share of preventable loss. Global estimates show particulate matter air pollution, high systolic blood pressure, smoking, and high fasting plasma glucose among the leading contributors to disability and death. Within India, cardiovascular diseases, chronic respiratory diseases, and diabetes account for a major proportion of deaths, reflecting rising exposure to blood pressure, adiposity, hyperglycaemia, and air pollution across states. Recent nationally representative data confirm high adult prevalence of diabetes, hypertension, obesity, abdominal obesity, and dyslipidaemia, with substantial interstate variation and higher urban burden. These patterns underscore the need to strengthen prevention, early detection, and continuous care at primary level.[112, 137–140]

Policy Shift: NPCDCS to NP-NCD

India's programme has transitioned from the original NPCDCS to an expanded National Programme for Prevention and Control of Noncommunicable Diseases (NP-NCD). The framework integrates with Ayushman Bharat-Health and Wellness Centres and the ABDM digital stack, adopts community risk assessment and universal screening from age 30 years, and emphasises uninterrupted drugs, diagnostics, longitudinal records, and referral pathways. The scope now includes COPD and asthma, chronic kidney disease, non-alcoholic fatty liver disease, stroke, and dialysis alongside diabetes, hypertension, cancers, and mental health, with explicit linkage to other national programmes including the National Oral Health Programme.[141–143]

Common Risk Factor Approach

NP-NCD operationalises a common risk factor approach that targets tobacco, alcohol, unhealthy diet, physical inactivity, and air pollution while addressing downstream metabolic risks such as obesity, raised blood pressure, hyperglycaemia, and dyslipidaemia. This aligns with contemporary evidence that the heaviest global burdens arise from air pollution and metabolic risks, and that sustained progress will depend on integrated, location-specific risk reduction supported by digital monitoring and routine primary care.[137, 141, 143]

Why Oral Health Must be Included?

Oral diseases affect an estimated 3.5 billion people and share the same commercial and behavioral determinants as other NCDs, especially sugars, tobacco, and alcohol. The

Lancet Public Health Viewpoint proposes evolving the global 5 × 5 framing to a 6 × 6 model by adding oral diseases as a sixth disease group and sugars as a sixth risk factor, thereby correcting longstanding neglect and enabling coherent policy, financing, and surveillance within UHC. For India's NP-NCD, this expansion would legitimize oral disease prevention and essential oral care at primary level, strengthen sugar policy coherence, and improve equity.[142]

Oral–Systemic Links and Indian Evidence

Indian studies document high co-occurrence of dental caries and periodontitis, with worse profiles in people with diabetes and among underserved populations. Integrating oral health into NCD services is supported by data associating hyperglycaemia with more severe caries and attachment loss, and by evidence from underserved and tribal settings where tobacco use and untreated oral lesions are common. Primary care models that embed oral screening and basic treatment into existing facilities, supplemented by mobile units and culturally adapted counselling, are feasible and acceptable.[144, 145]

Service Delivery: How to Integrate Within NP-NCD

Integration can follow NP-NCD's existing workflow. At community level, ASHAs administer CBAC and deliver brief advice on tobacco, diet, and oral hygiene including sugar reduction. At SHC-HWCs and PHC-HWCs, CHOs and dental teams can add visual oral examinations during NCD screening for adults 30 years and older, document findings in the National NCD Portal, and refer suspicious lesions for biopsy. District hospitals provide confirmatory diagnosis and treatment, while oral health teams support cessation, periodontal therapy, and risk-factor counselling that is synchronized with diabetes and hypertension care. Standard reporting formats already include oral cancer, enabling routine measurement and follow up.[111, 141, 146, 147]

Surveillance and Digital Health

Embedding oral indicators into NP-NCD's longitudinal records will close critical data gaps. Routine capture of oral screening, periodontal status proxies, tobacco use, and referrals at HWC and PHC levels can be integrated into the National NCD Portal and linked through ABHA for continuity. This approach responds to calls for an oral health information system aligned with NCD surveillance and supports real-time monitoring of common risk factors such as sugar intake and tobacco.[132, 135]

Environmental Risk and Primary Care Messaging

Given the high contribution of air pollution to NCD burden, primary care teams should couple tobacco and diet counselling with practical guidance on indoor air quality, safe cooking and heating practices, and recognition of toxic exposures. Evidence on

carbon monoxide poisoning highlights that unsafe combustion from stoves, heaters, or generators is a preventable cause of mortality, particularly in colder climates and energy-insecure households. Public education, regular maintenance of appliances, and where feasible, carbon monoxide detectors, can be incorporated into NP-NCD's risk-reduction messaging while addressing preventable hazards that disproportionately affect disadvantaged communities.[137, 148]

NP-NCD specifies structured training for CHOs, nurses, and data operators on screening, counselling, ICT use, and referral. Extending these modules to include oral examination, risk counselling on sugars, and basic periodontal care will leverage existing platforms at marginal cost. Uninterrupted supplies of essential NCD drugs and diagnostics should be complemented by basic dental consumables, fluoride varnish, atraumatic restorative kits, and biopsy supplies at appropriate levels. Aligning these investments with broader health financing priorities can advance equitable UHC for children and adults.

10.11 Tobacco Control and Dentistry: National Tobacco Control Programme (NTCP)

Tobacco use continues to be one of the leading causes of preventable morbidity and mortality in India, contributing to oral cancer, cardiovascular diseases, chronic respiratory conditions, and other non-communicable diseases (NCDs). Both smoking and smokeless forms are widely prevalent across all age groups, with smokeless tobacco use being especially common in rural and low-income populations. Recognising this, the Ministry of Health and Family Welfare (MoHFW) launched the National Tobacco Control Programme (NTCP) in 2007–08 to implement tobacco control policies, raise public awareness, enforce legislation, and expand cessation services. Integration of NTCP within the National Health Mission (NHM) has strengthened its reach, offering opportunities to embed oral health promotion and screening into existing tobacco control initiatives.[149, 150]

Objectives and Organisational Structure

The NTCP is guided by objectives to:

1. Reduce tobacco consumption and related diseases through legislative and programmatic interventions.
2. Promote awareness of the harms of tobacco use.
3. Enforce the provisions of the Cigarettes and Other Tobacco Products Act (COTPA), 2003.
4. Establish Tobacco Cessation Centres (TCCs) at district and state levels.
5. Integrate tobacco control into schools, workplaces, and other institutional settings.

The programme operates through a three-tier implementation model — the National Tobacco Control Cell, State Tobacco Control Cells, and District Tobacco Control Cells — each responsible for policy execution, capacity building, enforcement, and intersectoral coordination.[142, 143]

National Tobacco Control Cell (NTCC)

It serves as the apex technical and administrative body for implementing the NTCP at the national level. Located within the Ministry of Health and Family Welfare (MoHFW), it is responsible for policy formulation, strategic planning, and nationwide coordination of tobacco control initiatives. The NTCC develops operational guidelines, training modules, and IEC (Information, Education and Communication) materials in line with the WHO Framework Convention on Tobacco Control (FCTC) provisions. It allocates programme

funds to states, oversees utilisation, and monitors progress through a centralised reporting system. The cell also liaises with other ministries, non-governmental organisations (NGOs), and international agencies to ensure intersectoral collaboration. Additionally, it organises national-level media campaigns, supports research on tobacco epidemiology, and ensures that legislative amendments to the Cigarettes and Other Tobacco Products Act (COTPA) are aligned with global best practices.[151]

State Tobacco Control Cells (STCCs)

It functions as the nodal points for NTCP implementation at the state and union territory level. Operating under the State Health Directorate, these cells adapt national policies to the local context, ensuring culturally and linguistically appropriate interventions. Key responsibilities include capacity building of district-level staff, enforcement of COTPA provisions through coordination with state police and municipal authorities, and integration of tobacco cessation services within state health programmes. STCCs facilitate training of healthcare providers—including dental surgeons—in cessation protocols and oral lesion detection. They also conduct state-wide awareness drives, maintain databases of enforcement activities, and support compliance monitoring of Tobacco-Free Educational Institutions (ToFEI) guidelines. In states with high smokeless tobacco prevalence, STCCs often pilot targeted interventions such as gutkha de-addiction camps or integration with oral cancer screening programmes.[151, 152]

District Tobacco Control Cells (DTCCs)

At the grassroots, these are the operational arms of the programme, situated within the District Health Society. They implement NTCP activities in coordination with primary healthcare facilities, schools, workplaces, and community-based organisations. DTCCs organise district-level IEC campaigns, enforce tobacco-free public places, and monitor point-of-sale violations. They play a critical role in linking patients to Tobacco Cessation Centres (TCCs), maintaining referral records, and following up on quit attempts. These cells conduct community mobilisation events such as rallies, street plays, and health camps, often in collaboration with dental colleges and non-profits. Importantly, DTCCs collect field-level data on tobacco use patterns, enforcement actions, and cessation outcomes, feeding it back to the STCC for evaluation. In districts where dental colleges host TCCs, DTCCs partner with dental faculty and students to expand outreach and deliver integrated oral health and cessation services.[151]

Key Legislative Measures

The COTPA, 2003 provides the legal foundation for tobacco control, including:

1. Section 4: Prohibition of smoking in public places.
2. Section 5: Ban on direct and indirect tobacco advertising, promotion, and sponsorship.

3. Section 6: Restriction on sales to minors and near educational institutions.
4. Section 7: Mandating pictorial health warnings covering 85% of tobacco packaging.

Enforcement of these provisions is supported by NTCP's mass media campaigns, community outreach, and inter-departmental collaboration, though monitoring challenges remain.[152]

Tobacco Cessation Services under NTCP

A core NTCP component is strengthening cessation services, which include:

1. Tobacco Cessation Centres (TCCs) offering behavioural counselling, pharmacotherapy such as Nicotine Replacement Therapy (NRT), and follow-up care.
2. mCessation Programme, a mobile-based intervention delivering quit messages and motivational support.
3. National Tobacco Quitline Services providing free telephonic counselling and referrals.
4. These services are integrated with primary care through Health and Wellness Centres (HWCs), enabling frontline health workers to deliver brief interventions and make referrals.[153, 154]

DCI Mandate for TCCs in Dental Colleges

In 2018, the Dental Council of India (DCI) mandated the establishment of TCCs in all dental colleges, aligning them with NTCP's cessation framework. These centres function as specialised units for screening, counselling, and providing pharmacological support for tobacco users. Dental students are trained in tobacco intervention protocols, motivational interviewing, and early detection of tobacco-related oral lesions, enabling dental colleges to act as community cessation hubs.[155]

Integration with Oral Health Services

Oral health integration is supported through multiple NTCP linkages:

1. Under the Operational Guidelines for Oral Health Care at HWCs (2020), all adults are to be screened for tobacco use, with opportunistic oral examinations for potentially malignant disorders (PMDs).
2. The National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) incorporates oral cancer screening, with dentists and primary care teams trained to identify lesions such as leukoplakia, erythroplakia, and oral submucous fibrosis (OSMF).

3. HWCs are equipped to provide cessation counselling alongside other NCD services, ensuring a comprehensive preventive care package.[153, 154, 156]

Oral Health Implications of Tobacco

Evidence from Indian and global studies confirms that tobacco use is a primary risk factor for oral cancer, with high prevalence rates of PMDs among smokeless tobacco users. Periodontal health is significantly compromised in tobacco users, with increased risk of attachment loss, tooth mobility, and poor healing after dental procedures. Smoking is also associated with higher dental implant failure rates. Aesthetic and sensory impacts, such as tooth staining, halitosis, and taste alteration, are common among chronic users, reducing quality of life.[157]

Challenges in Implementation

Despite policy measures, NTCP faces several challenges:

1. Limited enforcement capacity for COTPA, particularly in rural areas.
2. High cultural acceptance of smokeless tobacco, especially among women and adolescents.
3. Shortage of trained cessation counsellors and uneven distribution of functional TCCs.
4. Gaps in integrating oral health screenings into all cessation encounters.
5. Inconsistent enforcement of state-level gutkha ban.[158]

Recommendations

To optimise NTCP's effectiveness and integrate oral health:

1. Make oral cancer screening a routine component of all cessation services.
2. Expand the role of dental professionals in community-based tobacco interventions.
3. Increase coverage of mCessation and Quitline services in rural and underserved areas.
4. Ensure continuous training for health workers on brief interventions and lesion detection.
5. Strengthen inter-programme coordination between NTCP, NPCDCS, and the National Oral Health Programme.

Such integration will not only enhance cessation outcomes but also contribute to early detection and management of tobacco-related oral diseases, reducing overall health burden.

10.12 Comprehensive Ageing Care: National Programme for Health care of Elderly and Oral Health

India is experiencing an unprecedented demographic shift, with the elderly population (aged ≥60 years) projected to rise to 319 million by 2050. This growth is accompanied by an increasing prevalence of non-communicable diseases (NCDs), functional disabilities, cognitive decline, and complex healthcare needs. The ageing process also brings a higher susceptibility to oral diseases such as edentulism, root caries, periodontal disease, xerostomia, and oral cancers, all of which can severely impact nutrition, speech, and quality of life. Addressing these challenges demands integrated health systems that can respond comprehensively to the unique requirements of older adults.[159]

Policy Background of NPHCE

Recognising the health needs of India's ageing population, the Ministry of Health and Family Welfare launched the National Programme for Health Care of the Elderly (NPHCE) in 2010–11 under the National Health Mission (NHM). The programme's vision is to ensure accessible, affordable, and comprehensive healthcare for the elderly, including preventive, promotive, curative, and rehabilitative services at all levels of care. It also aims to create dedicated infrastructure and skilled manpower, while promoting healthy ageing through community participation and convergence with allied ministries.[160]

Objectives of NPHCE

The primary objectives of NPHCE include:

1. Establishing specialised geriatric care units at primary, secondary, and tertiary levels.
2. Strengthening home-based and palliative care services for elderly patients with chronic or terminal illnesses.
3. Training healthcare professionals in geriatric medicine and integrated elder care.
4. Providing financial and social protection measures to reduce healthcare inequities in old age.
5. Encouraging lifestyle interventions, nutritional guidance, and awareness of oral health as part of overall healthy ageing strategies.[160]

Multi-Tiered Service Delivery Model

The NPHCE delivers services through a three-tiered structure:

1. Primary care: Screening for common ailments, oral health education, and home visits by ASHAs and primary care teams.

2. Secondary care: District hospitals provide geriatric outpatient clinics, 10-bedded geriatric wards, and rehabilitative physiotherapy services.
3. Tertiary care: Regional Geriatric Centres (RGCs) in selected medical colleges and National Centres for Ageing (NCAs) offer advanced diagnostics, specialised inpatient care, and training for healthcare professionals.

This model ensures a continuum of care from community to specialist services, with referral linkages to ensure patients receive the appropriate level of intervention.[160]

Role of LASI in Policy and Planning

A significant strength of the NPHCE framework is its integration with the Longitudinal Ageing Study in India (LASI), which provides nationally representative data on health, disability, social participation, and economic security among older adults.(159) LASI findings have informed service delivery priorities, highlighted oral health as a neglected component of geriatric care, and revealed strong associations between tooth loss, mastication ability, and systemic health outcomes such as cognitive decline.[161, 162]

Financing and Social Protection Measures

NPHCE works in synergy with financial and social protection programmes like PM-JAY (Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana) and the Indira Gandhi National Old Age Pension Scheme (IGNOAPS) to expand coverage for geriatric healthcare. These schemes reduce out-of-pocket expenditure and can be leveraged to include essential oral health services such as denture fabrication, oral cancer screening, and treatment of oral infections in vulnerable elderly populations.[159]

Oral Health in the Geriatric Population: Burden and Impact

Indian studies consistently report high prevalence of edentulism, advanced periodontal disease, untreated dental caries, and mucosal lesions in elderly populations. Poor oral health in old age not only affects chewing efficiency and nutrition but also contributes to social withdrawal, communication difficulties, and reduced quality of life. The lack of routine oral health assessment in geriatric care settings means that many conditions remain undiagnosed until they cause significant disability.[163]

Oral–Systemic Health Links in Indian Older Adults

Evidence from LASI-based analyses demonstrates a clear connection between oral health and systemic health. One study found that complete tooth loss was independently associated with lower cognitive performance in middle-aged and older Indian adults, supporting theories that impaired mastication and chronic oral inflammation may influence brain function.[161]

Another LASI analysis focusing exclusively on individuals aged ≥60 years confirmed that edentulism and difficulty chewing were significantly linked to cognitive

impairment, even after adjusting for socioeconomic and lifestyle factors. This highlights the importance of maintaining oral function as part of broader dementia-prevention strategies.[162]

Opportunities for Oral Health Integration Within NPHCE

The NPHCE provides multiple touch points to integrate oral healthcare seamlessly:

1. Including oral screening in routine geriatric check-ups at district and sub-district facilities.
2. Training ASHAs, community health officers (CHOs), and caregivers to recognise signs of oral disease, ill-fitting dentures, and oral cancers.
3. Establishing referral pathways from geriatric units to dental clinics for timely intervention.
4. Offering subsidised or free dentures under public insurance schemes.
5. Using tele-dentistry for follow-up and triage, especially in rural or immobile elderly populations.[160]

Implementation Challenges

Despite its progress, NPHCE faces challenges such as shortage of trained geriatric specialists, unequal programme coverage across states, and limited emphasis on oral health. The lack of dedicated funding for dental equipment and materials within NPHCE limits its capacity to offer comprehensive oral care. Additionally, low awareness about the relationship between oral and systemic health among both patients and healthcare workers further hampers integration efforts.[164]

Recommendations for Strengthening Integration

To ensure oral health becomes a standard part of geriatric care, the following measures are recommended:

1. Policy inclusion: Explicitly incorporate oral health indicators and service packages in NPHCE guidelines.
2. Capacity building: Train geriatric care providers in basic oral health assessment and referral protocols.
3. Infrastructure support: Allocate funds for dental units within district geriatric clinics and RGCs.
4. Insurance coverage: Include prosthetic rehabilitation, oral cancer screening, and basic dental treatment in PM-JAY and other state schemes.
5. Community outreach: Expand mobile dental clinics and oral health education campaigns targeting elderly communities.[159, 163–165]

The NPHCE represents a vital step in addressing the health needs of India's ageing population. By embedding oral health services into its framework, the programme can address a critical determinant of nutrition, communication, social interaction, and overall quality of life. Integration will not only improve geriatric well-being but may also reduce the burden of systemic diseases linked to poor oral health, fulfilling NPHCE's vision of healthy and dignified ageing.

10.13 Essential Medicines, Rational Drug use and Pharmacovigilance Programmes in India: Expanding the Scope to Oral Health

The Essential Medicines and Rational Use of Drugs Programme is a key pillar of India's public health system, designed to ensure equitable access to safe, effective, and affordable medicines. Its approach is grounded in the World Health Organization's (WHO) essential medicines concept introduced in 1977, which emphasises prioritising drugs that meet priority healthcare needs based on public health relevance, efficacy, safety, and cost-effectiveness. In India, the programme is operationalised through the National List of Essential Medicines (NLEM), most recently updated in 2022, which serves as the basis for public procurement, supply chain management, and pricing regulation under the Drug Price Control Order (DPCO). This system aims to minimise treatment costs, reduce inequities in access, and contribute to the goals of Universal Health Coverage (UHC).[166, 167]

The NLEM 2022 includes 384 medicines covering communicable and non-communicable disease management, maternal and child health, pain relief, and emergency care. Its revision followed a transparent process involving expert committee reviews, stakeholder consultations, and rigorous evaluation of therapeutic value, safety, and cost-effectiveness. By linking listed medicines to price caps through the National Pharmaceutical Pricing Authority (NPPA), the government ensures affordability while safeguarding quality standards.[167, 168]

A landmark development in oral health policy was the WHO's first-ever inclusion of three dental preparations—fluoride toothpaste, glass ionomer cement (GIC), and silver diamine fluoride (SDF)—in the Model List of Essential Medicines. These additions are supported by strong evidence demonstrating their role in preventing and managing dental caries, particularly in low-resource settings. Their integration into procurement systems offers an opportunity for India to expand preventive and restorative oral healthcare access, reduce the treatment gap, and promote mercury-free, minimally invasive dentistry.[169]

India's Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP) supplements this framework by operating over 9,500 Janaushadhi Kendras, which provide generic medicines at 70–80% lower prices than branded equivalents. However, dental medicines are underrepresented in these outlets. In a survey conducted among dental patients in Bangalore South, 95.5% expressed willingness to use generic medicines if assured of equivalent quality, yet 96.5% were unaware of their availability through PMBJP. This underscores the need for targeted awareness strategies in dental care.[170]

Pharmacovigilance, implemented through the Pharmacovigilance Programme of India (PvPI), is integral to the rational use of medicines. Established in 2010 and coordinated by the Indian Pharmacopoeia Commission, PvPI monitors drug safety through a network of over 600 Adverse Drug Reaction Monitoring Centres (AMCs) across the country. Dental practice frequently involves medicines—such as NSAIDs, local anaesthetics, antibiotics, and antifungals—that are associated with adverse drug reactions (ADRs). Despite this, ADR reporting from dental professionals remains low due to limited awareness, inadequate training, and lack of integration of pharmacovigilance into routine dental practice.[168, 171]

PvPI not only collects and analyses ADR data but also plays a role in shaping national drug safety policies. It operates within a structured network that encourages reporting through toll-free helplines, mobile applications, and standardised forms for healthcare professionals and patients. However, underreporting remains a persistent challenge. Studies show that many dental practitioners are unaware of PvPI or uncertain about ADR reporting procedures, with barriers including time constraints, perceived complexity, and lack of clarity on reportable events.[172]

Capacity building is a core strategy of PvPI, involving regular training sessions, workshops, and Continuing Medical Education (CME) programmes. The WHO–ISoP pharmacovigilance curriculum project has contributed to the development of comprehensive training resources that could be adapted for dental education. Integrating such modules into undergraduate and postgraduate dental curricula could significantly improve ADR recognition, reporting, and overall drug safety awareness among oral health professionals.[173]

Research in central Uttar Pradesh revealed that although most dental practitioners prescribed medicines daily, fewer than one-third were aware of PvPI, and even fewer knew the location of their institutional AMC. These gaps directly impact drug safety monitoring in dentistry, particularly for drugs prone to misuse or overuse, such as antibiotics. Without adequate ADR reporting, regulatory authorities may lack critical evidence to update safety warnings or restrict harmful drug combinations.[172, 174]

Antimicrobial resistance (AMR) is another priority area within the Essential Medicines framework. Dentistry contributes significantly to antibiotic consumption in India, with a systematic review reporting that 56–88% of dental antibiotic prescriptions were unnecessary. Drivers of misuse include lack of national dental antibiotic guidelines, insufficient undergraduate education on stewardship, and patient-driven demand, compounded by unrestricted over-the-counter sales.[175, 176]

Policy analysis indicates that introducing structured antibiotic stewardship programmes in dental settings could substantially reduce inappropriate prescribing. These programmes may include prescription audits, feedback mechanisms, and

restriction policies. Integration with India's National Action Plan on AMR would ensure alignment with broader national strategies.[175]

Evidence from intervention studies in dental colleges shows that antimicrobial stewardship training improves prescribing attitudes, even when short-term knowledge gains are limited. Making such training mandatory and linking it to professional licensing could promote long-term changes in prescribing behaviour, reducing AMR risk in dental practice.[177]

Affordability and accessibility of essential dental medicines remain inconsistent. Cost analyses of drugs for common oral conditions, such as oral candidiasis and recurrent aphthous stomatitis, reveal significant price variations between branded products and Jan Aushadhi alternatives. Despite their cost advantage, many essential dental medicines are absent from PMBJP inventories and state procurement lists, limiting patient benefit. Policy action to mandate their inclusion in public supply systems could reduce out-of-pocket expenditure and improve treatment equity.[178]

From a systems perspective, linking essential medicines lists with broader health system strengthening is critical. A Lancet policy analysis emphasised that sustained access requires not only updated medicines lists but also robust regulatory frameworks, adequate workforce training, and equitable distribution networks. It recommended integrating oral health commodities—such as fluoride toothpaste and atraumatic restorative treatment materials—into national procurement strategies to meet UHC goals.[179]

Recommendations for Strengthening the Essential Medicines and Rational Drug Use Framework in Dentistry

1. Inclusion of fluoride toothpaste, SDF, and GIC in India's NLEM.
2. Development of national dental antibiotic guidelines.
3. Expansion of PMBJP to include dental medicines.
4. Integration of pharmacovigilance training in dental education.
5. Mandatory prescription audits with stewardship interventions in dental facilities.

In conclusion, the Essential Medicines and Rational Use of Drugs Programme, reinforced by PvPI, provides a strategic platform for enhancing oral healthcare within India's public health agenda. Strengthening the integration of dental pharmacovigilance, expanding access to affordable dental medicines, and embedding stewardship principles can collectively reduce the oral disease burden, improve patient safety, and align dentistry with the nation's universal health coverage objectives.[169–171, 175–179]

10.14 Role of Dentistry within National Emergency Preparedness Program

India's geographical, climatic, and socio-economic diversity makes it highly vulnerable to a wide range of natural and anthropogenic disasters, including earthquakes, floods, cyclones, epidemics, industrial accidents, and CBRN threats. Recognizing the public health implications, the Government of India has implemented a suite of National Emergency Preparedness Programs under the Ministry of Health and Family Welfare (MoHFW), the National Disaster Management Authority (NDMA), and the National Centre for Disease Control (NCDC).(1) In parallel, professional bodies and international agencies have advocated for the integration of oral health professionals into these frameworks, emphasising their potential contributions in triage, forensic odontology, and trauma care.[180, 181]

Objectives of National Emergency Preparedness Programs

The key objectives are to:

1. Enhance disaster risk reduction strategies for public health emergencies.
2. Develop and maintain national, state, and district-level emergency response infrastructure.
3. Train first responders, healthcare professionals, and volunteers in disaster management.
4. Ensure availability of medical supplies, emergency medical teams (EMTs), and mobile health units.
5. Strengthen surveillance and early warning systems for epidemic and pandemic threats.

These objectives are mirrored in the National Disaster Management Plan (NDMP), which emphasises a multi-hazard approach, coordination between sectors, and preparedness drills at regular intervals.[173]

Key National Emergency Preparedness Programs

National Disaster Management Plan (NDMP)

Serves as a comprehensive, legally backed framework for disaster risk reduction and emergency response. It mandates the establishment of Emergency Operations Centres (EOCs) at state and district levels and includes hospital preparedness measures for mass casualty incidents.[182]

National Health Emergency Preparedness and Response Network (NHEPRN)

Focuses on resilience building in healthcare systems during disasters, epidemics, and bioterrorism through mass casualty management guidelines and rapid EMT deployment.

Integrated Disease Surveillance Programme (IDSP)

Strengthens early outbreak detection, real-time reporting, and the deployment of Rapid Response Teams (RRTs).

COVID-19 Emergency Response Plan

Enhanced intensive care capacity, implemented vaccine rollouts, and established bio-containment facilities.

CBRN Emergency Preparedness Program

Develops protocols for chemical, biological, radiological, and nuclear emergencies.[1]

Community and Volunteer Preparedness

The Social and Emergency Response Volunteer (SERV) program of the Indian Red Cross Society is a community-based initiative that mobilises and trains volunteers in first aid, Basic Life Support (BLS), and disaster coordination. SERV's decentralized approach ensures rapid local-level response and could be extended to train volunteers in oral health screening and emergency referral during disasters.[183]

Integration of Oral Health in Emergency Preparedness

Dentistry's inclusion in emergency planning is increasingly recognised in international and national discourse. The New Delhi Declaration 2020 explicitly calls for integrating dental health professionals into multidisciplinary disaster management teams.[181] Dentists can contribute in:

1. Forensic odontology for victim identification in mass casualty events.[180]
2. Primary and secondary trauma management, especially maxillofacial injuries.[180, 181]
3. Public health roles such as infection prevention in shelters and surveillance for oral infections in displaced populations.[1]

Preparedness Gaps in the Dental Sector

Despite their potential role, studies indicate that most dental professionals have limited exposure to disaster preparedness training. A survey on healthcare workers' readiness for disaster participation revealed low levels of structured training among dentists

compared to other health professions, emphasising the need for curriculum reforms. The integration-of-dental-health-professionals-in-disaster-management report also highlighted a lack of representation of dental professionals in national drills and simulations.[181, 184]

BLS Competence in Dentistry

BLS competence is a critical skill in disaster situations involving trauma, cardiac arrest, or airway compromise. Evidence suggests that without regular refresher courses, BLS skills deteriorate within months of initial training.[184] Embedding periodic BLS certification in dental education and linking with SERV training modules can help create a reserve pool of dental first responders.[183]

Challenges

1. Limited policy-level inclusion of oral health in disaster management plans.
2. Lack of structured disaster training modules in dental curricula.
3. Insufficient representation of dentists in national emergency simulations.
4. Gaps in rural and remote disaster dental infrastructure.[181, 184]

Recommendations

1. Policy Inclusion: Incorporate dentistry in national and state disaster management policies.[181]
2. Training and Capacity Building: Implement mandatory BLS, triage, and forensic odontology training for dental students and practitioners.[181, 184]
3. Integration with SERV: Help create a reserve pool of dental first responders.[183]
4. Research and Evidence Generation: Encourage studies on oral health needs in post-disaster settings.[181]

National Emergency Preparedness Programs are central to India's disaster resilience strategy. By integrating dentistry into these frameworks—through policy inclusion, targeted training, and community-based volunteer engagement—the nation can enhance both immediate response capabilities and long-term recovery outcomes.

10.15 School Health Programme and Oral Health Initiatives in India

School health programmes form an essential pillar of public health, offering structured avenues for promoting child and adolescent well-being. Schools provide an organised environment where preventive, promotive, and curative health services can be implemented systematically. In India, the School Health Programme (SHP) is integrated into the Ayushman Bharat Health and Wellness Centres (HWCs) under the National Health Mission (NHM). This integration covers areas including general health screening, immunisation, nutrition counselling, mental health support, and oral health promotion, with the overarching aim of reducing absenteeism and improving long-term health outcomes.[185]

Historical Evolution of School Health Services in India

The concept of school health services in India dates back to 1909, when the erstwhile Baroda province initiated medical examinations for schoolchildren. The Bhore Committee (1946) highlighted the lack of structured school health services. Over time, initiatives such as the WHO-supported school health education project (1957), the establishment of a dedicated School Health Committee (1960), and the launch of the centrally sponsored National School Health Scheme (1977) laid the groundwork for comprehensive child health interventions. International frameworks, including the Tokyo Declaration (2001), Ayutthaya Declaration (2003), and Bangalore Declaration (2005), further reinforced the inclusion of oral health in school health strategies.[186]

School Health Programme under Ayushman Bharat

Launched in 2018, the SHP is jointly implemented by the Ministry of Health and Family Welfare and the Ministry of Education. The programme designates two trained Health and Wellness Ambassadors in each school—preferably one male and one female teacher—who deliver weekly interactive sessions across twelve thematic areas, including hygiene, nutrition, mental well-being, substance abuse prevention, and reproductive health. The SHP works in convergence with Rashtriya Bal Swasthya Karyakram (RBSK) and Rashtriya Kishor Swasthya Karyakram (RKSK), ensuring coordinated outreach and follow-up care.[187]

Core Components and Health Interventions

The SHP incorporates multiple targeted interventions:

1. RBSK: Screening for Defects at Birth, Diseases, Deficiencies, and Developmental Delays, with referral pathways for further management.

2. Weekly Iron and Folic Acid Supplementation (WIFS): Addressing adolescent anaemia through weekly supplementation and nutrition education.
3. National Deworming Day (NDD): Biannual administration of Albendazole to reduce helminthic burden.
4. Menstrual Hygiene Scheme (MHS): Provision of sanitary napkins and menstrual hygiene education.
5. Oral Health Promotion: Dental check-ups, fluoride varnish application, and behavioural interventions on toothbrushing, diet, and tobacco prevention.[185, 187]

Integration of Oral Health into School Health Initiatives

The National Oral Health Programme (NOHP) launched in 2014–15 provides a framework for integrating oral health into broader public health platforms, including schools. Primary Health Centres (PHCs) deliver preventive care and screening for oral diseases, while Community Health Centres (CHCs) provide restorative and surgical dental services. School-based outreach often includes oral health education sessions, demonstration of correct brushing techniques, and referrals for treatment. However, challenges such as inadequate dental infrastructure, shortage of workforce, and weak referral linkages limit the reach and impact of these initiatives.[40]

School-Based Oral Health Programmes in India

Several models of school oral health programmes have been implemented across India:

1. Fluoride-Based Interventions: Mouth rinses, tablets, and milk or water fluoridation have reduced dental caries incidence by 30–43% in targeted populations.
2. Pit and Fissure Sealants: Shown to prevent up to 78% of occlusal caries when applied selectively in school programmes.
3. Teacher-Led Oral Health Education: Produces sustained improvements in oral hygiene when reinforced regularly.[186]
4. Anant Muskaan (2024–27): An ICMR-supported, multi-site school initiative promoting daily supervised tooth brushing with fluoridated toothpaste, teacher-led oral health sessions, provision of oral hygiene kits, and regular dental check-ups in primary schools across eight districts.[188]

A systematic review of school-based oral health education programmes in India highlighted significant improvements in oral hygiene indices, with teacher training emerging as a critical factor in sustaining positive outcomes.[189]

Implementation Status and Operational Insights

Assessments reveal uneven readiness and implementation of SHP activities across states. In Punjab, for instance, an evaluation of HWCs found that only 27% met

prescribed staffing norms, with gaps in training, supplies, and referral mechanisms.[190] National reviews note that, while the SHP is aligned with WHO's Health-Promoting Schools model, on-the-ground activities often focus heavily on screenings, with insufficient emphasis on ongoing health promotion and follow-up.[187, 191]

Challenges in Delivery and Sustainability

Major barriers include:

1. Limited incorporation of oral health in SHP's core activity plans.
2. Shortage of trained personnel, particularly dental professionals in rural areas.
3. Irregular follow-up for children diagnosed with health issues.
4. Weak health–education sector coordination.
5. Dependence on short-term dental camps rather than continuous services.[40, 187, 191]

Recommendations for Strengthening Services

Key measures to enhance SHP and oral health integration include:

1. Mandating regular oral health screenings across government and private schools.
2. Incorporating oral health into teacher training curricula.
3. Strengthening referral linkages between schools and dental units in the public sector.
4. Including oral health indicators in SHP monitoring frameworks.
5. Increasing community engagement to improve health literacy.
6. Enhancing intersectoral collaboration for accountability and resource sharing. [185, 187, 191]

The School Health Programme under Ayushman Bharat offers a unique platform to address both general and oral health needs of schoolchildren. With India's high burden of preventable dental diseases, integrating oral health within SHP is both necessary and feasible. Strengthening infrastructure, workforce, and governance, along with sustained community participation, will be key to making SHP a comprehensive, equitable, and impactful public health initiative.[186, 187, 191]

Multidimensional view of Health Education in Schools

Health education is recognised as a cornerstone of holistic development in children, fostering not only physical health but also mental, emotional, and social well-being. The World Health Organization defines health as a state of complete physical, mental, and social well-being, rather than the mere absence of disease. Within this framework,

school-based health education goes beyond knowledge dissemination; it equips students with the attitudes, values, and skills necessary for making informed health decisions throughout life.[192]

Conceptual analysis of health education highlights its multidimensional nature, encompassing ten key domains: physical, mental, social, emotional, spiritual, vocational, educational, nutritional, environmental, and preventive–curative aspects. Each dimension plays a vital role in shaping a child's overall well-being. For example, the physical and nutritional dimensions emphasise proper growth, diet, and activity, while emotional and social dimensions focus on resilience, empathy, and positive interpersonal relationships. By addressing these dimensions in an integrated manner, health education fosters balanced development and prepares children to adapt constructively to societal demands.[192]

Role of Health Education in Student Development

Evidence from school systems in Indonesia underscores that health education enhances concentration, endurance, and learning motivation, which in turn support academic achievement. Healthy students exhibit better attendance, stronger engagement, and improved academic performance. Health education in schools typically combines formal classroom-based teaching with informal activities such as extracurricular projects and peer-led initiatives, creating a comprehensive environment for learning. Importantly, such programmes have been shown to improve students' knowledge, shape positive attitudes, and develop essential skills for health maintenance. These include self-care practices, coping mechanisms, and decision-making abilities.

Beyond immediate benefits, health education also contributes to the creation of a healthy learning environment. By integrating health topics into everyday school life, it nurtures a culture where well-being is valued, thereby reducing risky behaviours and promoting protective habits. For instance, students exposed to structured health education are more likely to adopt safe practices related to nutrition, sexual health, and mental health. This alignment between health and education demonstrates that academic success and student health are mutually reinforcing goals.[193]

Health Education and Health Literacy: A Collaborative Imperative

Recent scholarship emphasises the need to integrate health literacy into school health education. Health literacy, defined as the capacity to access, understand, and use health information for appropriate decision-making, is essential for empowering children in the context of modern health challenges. The COVID-19 pandemic highlighted gaps in children's ability to critically engage with health information, reinforcing the urgency of embedding literacy-based competencies into school curricula.

The National Academies' framework for school health education recommends a skills-based approach that not only delivers functional health knowledge but also cultivates decision-making, goal-setting, communication, and advocacy skills. Effective curricula are expected to be theory-driven, culturally sensitive, age-appropriate, and reinforced by opportunities for practice. Initiatives such as the Whole School, Whole Community, Whole Child (WSCC) model, adopted in the United States, and the Statewide Health Improvement Partnership in Minnesota provide examples of how collaboration between health and education sectors can improve outcomes. These frameworks stress that health education should extend beyond classrooms, engaging families, communities, and policymakers in creating sustainable support systems.[194]

Future Directions

The collective insights from international and conceptual analyses reveal several implications. First, health education must be contextualised within cultural and societal realities, addressing pressing concerns such as malnutrition, obesity, reproductive health, and mental health. Second, teacher preparation and continuous professional development are indispensable, as educators act as primary facilitators of health learning. Third, future interventions should leverage digital technology, interactive pedagogies, and community partnerships to make health education more engaging and impactful.

Finally, health education is not merely a subject within the curriculum but a transformative process that builds life skills, resilience, and agency in young learners. By cultivating health literacy, schools equip students not only to protect their own well-being but also to contribute positively to the health of their families and communities. This dual benefit reinforces the argument that health education is integral to the vision of sustainable development and long-term public health improvement.[192–194]

10.16 National Programme for Prevention and Control of Fluorosis (NPPCF): Public Health Action through Oral Health Integration

Fluorosis is a chronic condition resulting from prolonged ingestion of excess fluoride, most commonly through groundwater in geogenic "hotspots." It manifests in three clinical forms—dental fluorosis, skeletal fluorosis, and non-skeletal fluorosis—each with distinct functional and social implications. India, situated in the global fluoride belt extending from Turkey through North Africa to China, bears one of the world's largest fluorosis burdens. The World Health Organization (WHO) prescribes a maximum fluoride concentration of 1.5 mg/L in drinking water, whereas the Bureau of Indian Standards (BIS) recommends a more stringent desirable limit of 1.0 mg/L, with the advisory "lesser the better" to account for India's climatic conditions and high water intake rates.[195–197]

Recent geospatial modelling using 12,600 groundwater fluoride measurements identified the north-western states (Delhi, Haryana, Punjab, Rajasthan, Gujarat) and southern peninsular states (Andhra Pradesh, Telangana, Karnataka, Tamil Nadu) as high-risk belts, with an estimated ~120 million individuals exposed to concentrations above 1.5 mg/L. Data from the 2024 Central Ground Water Board (CGWB) reaffirmed extensive exceedances, revealing seasonal declines post-monsoon yet persistent exceedances year-round in several states.[198, 199]

At the population level, a 2025 systematic review and meta-analysis synthesising 55 studies (n = 108,678) reported a pooled overall prevalence of dental fluorosis at 34.5%, rising to over 50% in areas with water fluoride levels exceeding 1 ppm. The burden among children aged 5–18 years was 32.1%. State-level studies demonstrate even higher prevalence in certain districts—Raichur, Karnataka (46%), Kolar, Karnataka (64.3%), and endemic areas of Haryana (up to 96.6%)—underscoring the urgency for targeted interventions.[200–202]

Programme Genesis, Goal, and Objectives

The National Programme for Prevention and Control of Fluorosis (NPPCF) was launched in 2008–09 under the Ministry of Health and Family Welfare (MoHFW) as part of India's public health response to fluoride toxicity. Initially implemented in 100 districts across 17 states during the 11th Five-Year Plan, it was subsequently expanded under the 12th Plan to cover an additional 95 districts, with integration into the National Health Mission (NHM) through the NCD flexi-pool.[197, 203]

The programme's overarching goals are to:

1. Establish a baseline database on the prevalence of fluorosis and fluoride contamination.

2. Implement comprehensive preventive, diagnostic, and management measures in identified districts.
3. Build capacity at district and community levels for sustained prevention and control.[197, 203]

Key Components and Activities

Surveillance and Monitoring

Systematic surveillance is the programme's foundation, involving school-based and community-level surveys to detect dental fluorosis using standardised screening proformas. Environmental monitoring includes water fluoride testing and urinary fluoride estimation, supported by upgraded district laboratories equipped with ion-selective electrode meters. Periodic re-surveys evaluate the impact of interventions and help update district fluorosis maps.[197]

Diagnostics and Case Management

NPPCF strengthens district hospitals and medical colleges to provide confirmatory testing and clinical evaluation. Management strategies prioritise nutritional supplementation (calcium, vitamins C and D, antioxidants), physiotherapy for skeletal cases, and rehabilitative services including corrective orthopaedic surgery where needed. Referral pathways link primary health centres to tertiary hospitals for advanced care.[197]

Provision of Safe Water and Defluoridation

Collaboration with Public Health Engineering Departments (PHED) and the Ministry of Jal Shakti ensures provision of safe drinking water through piped supply schemes, rainwater harvesting, and point-of-use or community-level defluoridation plants. Techniques such as the Nalgonda process, activated alumina adsorption, and nanofiltration are deployed in accordance with BIS and WHO guidelines. Seasonal reductions in fluoride following the monsoon, while beneficial, are insufficient to mitigate risk without year-round interventions.[196, 203, 204]

Information, Education, and Communication (IEC)

The programme's IEC strategy employs multi-format materials—posters, brochures, audio spots, and videos—distributed to communities and schools. Special emphasis is placed on teacher training, dietary modification (avoiding rock salt and high-fluoride foods), and behavioural messaging to encourage use of safe water sources. Evidence from West Bengal demonstrates significant improvement in both dental and skeletal fluorosis symptoms within months of switching to low-fluoride water, highlighting the synergy between infrastructure and behaviour change.[197, 203, 205]

Oral Health and Fluorosis: Clinical Features, Indices, and Integration Points

Dental fluorosis is an early biomarker of chronic fluoride exposure, often manifesting years before skeletal signs. It presents as bilateral, symmetrical opacities, ranging from faint white striations to brown stains and enamel pitting in severe cases. The central/lateral incisors and molars are most frequently involved, reflecting the timing of enamel maturation. In children under eight years, susceptibility is heightened by ingestion of fluoride from water, food, and swallowed toothpaste.[206]

Integration of oral health into NPPCF can enhance detection and referral. Adopting Dean's Index or Thylstrup–Fejerskov Index (TFI) enables standardised grading, facilitating public health surveillance and patient management. Linking dental examination data with water and urinary fluoride results strengthens epidemiological mapping and guides targeted interventions.[201, 202, 206]

Determinants of Groundwater Fluoride and Implications for Control

The geogenic origin of fluoride in India stems from weathering of fluoride-rich minerals (fluorite, fluorapatite, biotite micas) in granitic and volcanic terrains. Hydrogeochemical conditions such as alkaline pH, Na-HCO_3 water types, and prolonged water–rock interaction promote fluoride mobilisation. Anthropogenic sources—notably phosphate fertiliser leaching and industrial emissions—can exacerbate contamination locally. These determinants explain the clustering of fluoride hotspots and necessitate aquifer-specific mitigation strategies that align with NPPCF's clinical and IEC components.[198, 207]

Challenges in Implementation

Several operational constraints limit programme effectiveness:

1. Inconsistent rural monitoring of water sources, leading to gaps in exposure mapping.
2. Limited adoption and maintenance of defluoridation units in remote areas.
3. Low community awareness of fluoride toxicity and prevention measures.
4. Seasonal dilution post-monsoon often results in false perception of safety, with fluoride levels rebounding in the dry season.[199, 203, 206]

Addressing these challenges requires continuous surveillance, stable safe-water provision, and sustained IEC engagement.

Recommendations and Opportunities for Stronger Oral Health Integration

School Dental Screening with Water Testing

Co-locating oral health camps and fluoride testing in schools can enable early detection and immediate household-level interventions.[206]

Standardised Index Use and Referral Pathways

Employ Dean's or TFI indices in NPPCF surveys and establish clear referral loops from school screenings to district hospitals.[197]

Safe-Water Assurance

Prioritise piped safe-water schemes and defluoridation in mapped hotspots, integrating with CGWB hazard mapping for precise targeting.[199]

Behaviour Change Messaging

Promote supervised use of age-appropriate fluoride toothpaste and dietary modifications to reduce total fluoride load.[206]

Outcome Monitoring

Implement longitudinal tracking using urinary fluoride and clinical symptom panels to measure intervention impact; West Bengal data show measurable improvements within months.[205]

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CHAPTER

11

Oral Health at Grassroots: Community Level Actions

Community-level interventions form the operational backbone of oral health promotion and integration into primary healthcare in India. While national programmes provide policy direction and institutional frameworks, it is at the grassroots—through village-based activities, frontline health worker engagement, and public health dentistry outreach—that these policies translate into tangible health outcomes. Such interventions function not only to deliver preventive and promotive oral healthcare but also to address systemic inequalities by targeting populations with the least access to dental services. By embedding oral health into routine community health structures, these initiatives contribute to early disease detection, reduce treatment delays, and promote healthier lifestyles, aligning with the broader national agenda of universal health coverage and equitable health outcomes.[208–212]

Frontline Health Workers: ASHAs and ANMs as Catalysts for Oral Health

Accredited Social Health Activists (ASHAs) and Auxiliary Nurse Midwives (ANMs) are pivotal in rural health delivery systems. Positioned as the first point of contact between the health system and the community, they routinely address sanitation, nutrition, immunisation, and maternal-child health. Increasingly, their roles are being expanded to include oral health education and counselling.

Evidence underscores the impact of structured oral health training on these cadres. In Western Uttar Pradesh and Delhi NCR, a promotive intervention involving 301 ASHAs and Anganwadi workers demonstrated significant improvements in oral health knowledge—mean scores rose from 14.67 ± 1.15 at baseline to 20.96 ± 1.05 post-intervention, and further to 27.6 ± 0.76 after reinforcement. The combination approach of delivering health talks, distributing pictorial pamphlets/posters, and demonstrating oral hygiene techniques produced the most substantial gains, outperforming single-method education such as PowerPoint presentations.[208]

Similarly, in Nellore district, Andhra Pradesh, training 118 primary healthcare workers through an interactive educational programme resulted in a mean improvement

of 12.56 ± 3.23 in knowledge scores ($p < 0.001$). The study highlighted the feasibility of integrating oral health into existing primary healthcare activities such as school health and Integrated Child Development Services (ICDS).[210]

Despite these positive outcomes, knowledge gaps remain. In a cross-sectional study of 190 ASHA workers in Kerala, correct responses regarding Early Childhood Caries (ECC) prevention averaged only 55.76%, despite favourable attitudes toward child oral health (74.76%). The most notable deficiencies included lack of awareness about the recommended timing of a child's first dental visit and appropriate home-based oral hygiene practices.[209] These findings collectively indicate that systematic, recurrent training tailored to local contexts is essential for embedding oral health into the core responsibilities of ASHAs and ANMs.

Community Outreach by Public Health Dentists

Public health dentists extend preventive and promotive oral health services to underserved and high-risk populations through strategically planned outreach. Dental colleges and National Oral Health Programme (NOHP) teams frequently organise rural dental camps, workplace oral health drives, school-based screenings, and geriatric oral health services. When paired with general health camps, these initiatives facilitate integrated care—offering blood pressure measurement, blood glucose testing, and oral examinations in the same setting.[208, 210]

Such outreach enables early detection of oral diseases, reducing the risk of progression to severe conditions like advanced periodontitis or oral cancer. For instance, timely management of gingival inflammation detected during a village camp can prevent tooth loss, maintain masticatory function, and thus preserve nutritional adequacy.

Coordination with Panchayati Raj Institutions further strengthens these efforts. Community-driven campaigns, such as "No Tobacco Village" or "Caries-Free Village," mobilise local leadership and social networks to foster collective behaviour change. When linked to NOHP, these campaigns benefit from technical guidance, supply chains for preventive materials (e.g., fluoride toothpaste), and monitoring frameworks.[211]

Integration with Nutrition and WASH Programmes

Malnutrition and poor oral health are interconnected through a bidirectional risk pathway. Nutritional deficiencies can weaken oral tissues, making them more susceptible to disease, while oral diseases—such as dental caries or advanced periodontal conditions—can impair mastication, reduce dietary variety, and compromise nutrient absorption. This synergy presents a valuable opportunity to integrate oral health promotion into established community-based nutrition and hygiene programmes.

Initiatives like Poshan Abhiyaan and Swachh Bharat Mission have progressively incorporated oral health into their hygiene education components. During village-level

campaigns, hygiene checklists now commonly include toothbrushing twice daily with fluoride toothpaste, discouraging tobacco-based dentifrices, and eliminating harmful feeding practices such as prolonged bottle feeding at night. Embedding oral hygiene alongside handwashing and sanitation within broader hygiene narratives ensures that it is perceived as a daily essential rather than an optional practice. This inclusive approach strengthens preventive oral health behaviours from early childhood and normalises them as part of household hygiene routines.[209,211]

Community Surveillance and Research

Accurate and timely data at the community level are essential for evidence-based oral health planning. Several state health departments under the National Health Mission have begun pilot initiatives to incorporate oral health indicators—such as prevalence of complete dentition among adolescents or the proportion of adults with an annual dental visit—into routine household surveys. These indicators provide actionable insights to guide targeted interventions, resource allocation, and programme evaluation.

A 2025 systematic review and meta-analysis synthesising findings from 37 studies revealed that ASHAs' knowledge levels varied considerably across health domains and regions. While pooled knowledge prevalence for non-communicable diseases was relatively high at 73%, knowledge on specific areas such as oral cancer prevention was much lower. The review identified key determinants influencing knowledge, including educational attainment, years of experience, frequency of training, and quality of supervision. Integrating oral health metrics into existing community surveillance frameworks would allow for precision-targeted interventions—such as subsidised fluoride toothpaste distribution in low-use areas or intensified oral cancer screening campaigns in districts with high tobacco use—thereby enhancing the responsiveness and efficiency of oral health strategies.[212]

Capacity Building and Multi-Sectoral Partnerships

Expanding the oral health workforce at the community level often involves training non-dental personnel such as teachers, Anganwadi workers, and members of self-help groups. Training modules have included community fluoride testing to prevent fluorosis, oral health promotion through school curricula, and workplace oral health policies.[208, 210]

Public–private partnerships (PPPs) and corporate social responsibility (CSR) projects have further broadened reach. For example, mobile dental vans operated by industry partners have served mining communities in Jharkhand and Odisha, delivering preventive and basic curative care while simultaneously engaging in health education.[211]

Stakeholder consultations in Delhi revealed that 88.3% of ASHAs and 85.7% of ANMs were willing to incorporate oral health screening into routine work, but cited inadequate training, insufficient monetary incentives, and heavy workloads as barriers. Positive motivators included community respect, goodwill, and recognition, suggesting that structured incentives and supportive supervision could significantly improve uptake.[211]

Role of Public Health Dentists in Integration

Public health dentists serve as technical experts, educators, and advocates for oral health integration. Their responsibilities extend from designing culturally and linguistically appropriate information, education, and communication (IEC) materials to training frontline health workers in basic screening and counselling skills. They also mobilise multi-sector collaborations during health observance days—such as World Oral Health Day, National Oral Hygiene Day, and No Tobacco Day—ensuring that oral health messages reach wide audiences through coordinated, high-visibility events.[197, 200]

By aligning community outreach activities with policy priorities under NOHP and NHM, public health dentists ensure that oral health promotion is sustained, scalable, and responsive to emerging public health challenges.

Public Health Outcomes and Policy Implications

Community-level integration of oral health generates measurable public health benefits:

1. Disease burden reduction: Early detection and treatment reduce prevalence of dental caries, periodontal disease, and oral cancer.
2. Nutritional improvement: Restored or preserved dentition supports dietary diversity.
3. Cost savings: Preventive care through camps and community education is substantially less expensive than advanced treatment.
4. Health literacy: Communities become informed stakeholders, capable of adopting preventive behaviours and demanding quality care.

The success of such integration depends on sustained investment in training, resources, and supervisory structures for ASHAs, ANMs, and allied community workers. As Singh et al.'s review emphasises, strengthening ASHAs' capabilities through continuous education and structured support systems will enhance their ability to deliver oral health interventions as part of comprehensive primary healthcare.[212] Embedding oral health into every relevant community programme operationalises the principle of "oral health in all policies," ensuring prevention and care reach every individual.

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CHAPTER

12

Learning from Global Oral Health Policy Milestones Towards UHC: Implications for Sustainable Oral Health Integration

Oral health has emerged as a critical component of Universal Health Coverage (UHC) due to its strong links with non-communicable diseases (NCDs), quality of life, and economic productivity. The global policy landscape between 2021 and 2025 has been particularly transformative, marking a shift from viewing oral health as a clinical specialty service to recognising it as a public health priority and a human right. Four key milestones—WHA74.5 Resolution (2021), the WHO Global Oral Health Status Report (2022), the Bangkok Declaration (2024), and the FDI–IADR Advocacy Priorities (2025)—have collectively set the direction for integrating oral health into UHC, focusing on prevention, equity, and sustainability.[3, 213–215]

This chapter examines each milestone in turn, analyses its implications for India, and outlines recommendations for operationalising these global frameworks within the Indian context.

WHA74.5 Resolution on Oral Health (2021)

Adopted at the 74th World Health Assembly, Resolution WHA74.5 marked a historic commitment to include oral health within the broader NCD and UHC agendas. The resolution emphasised addressing common risk factors—such as tobacco use, unhealthy diets high in free sugars, and harmful alcohol consumption—while promoting integration of oral health into primary healthcare systems.[213] It called for development of a Global Oral Health Action Plan (2023–2030) and urged Member States to strengthen surveillance, financing, and workforce capacity to reduce inequalities in oral health access and outcomes.

For India, the WHA74.5 framework aligns with national priorities but exposes systemic gaps. The absence of a national oral health policy with legislative backing and limited integration of oral health into the National Health Mission have constrained service coverage. With over 70% of dental expenditure paid out-of-pocket and dental care remaining predominantly private-sector-driven, financial protection is limited.[42] The WHO Oral Health Country Profile for India further underscores these disparities, reporting stark differences in oral disease prevalence and service utilisation between

rural and urban populations, with preventive service uptake remaining below 30% in most states.[46]

Workforce distribution is heavily skewed towards urban areas, with a dentist-to-population ratio of 1:10,000 in cities versus 1:150,000 in rural areas. Adopting WHA74.5 recommendations could catalyse reforms such as introducing a Basic Package of Oral Care (BPOC) in all Health and Wellness Centres (HWCs), embedding oral health in state PIP (Programme Implementation Plan) budgets, and integrating surveillance into the Health Management Information System (HMIS).[213]

WHO Global Oral Health Status Report (GOHSR, 2022)

The GOHSR provided the first comprehensive global baseline for oral health, reporting that 3.5 billion people worldwide are affected by oral diseases, with untreated dental caries alone impacting 2.5 billion individuals. It highlighted stark inequalities—oral diseases are more prevalent in low- and middle-income countries, and the burden disproportionately affects vulnerable and marginalised populations. This aligns with global burden estimates showing that oral conditions rank among the most prevalent diseases worldwide, affecting 3.5 billion people and contributing significantly to disability-adjusted life years (DALYs), with a rising trend over the past two decades in low- and middle-income countries.[143]

The report quantified the global economic cost of oral diseases at US$ 387 billion in direct treatment costs and US$ 323 billion in productivity losses annually. It called for prevention-focused strategies, universal service coverage, and integration into primary healthcare as cost-effective solutions.[3]

India's country profile within the GOHSR data underscores a high burden: 44% prevalence of untreated caries in 5-year-olds, 28% in young adults, 19% severe periodontal disease prevalence among middle-aged adults, and 16% complete tooth loss in the elderly.[42] The report revealed service coverage gaps—less than 30% of adults access preventive dental care annually—and a lack of a national surveillance system for oral health. Furthermore, economic constraints hinder access, with dental care costs pushing households into catastrophic health expenditure. Implementing GOHSR recommendations in India would require prioritising preventive interventions, integrating oral health into NCD screening protocols, and ensuring financial protection under Ayushman Bharat.[3, 42]

Bangkok Declaration on Oral Health (2024)

The Bangkok Declaration, adopted at the 17th World Conference on Oral Health Promotion, reinforced the urgency of integrating oral health into global health and development agendas. It set a target for 50% reduction in untreated dental caries and

severe periodontitis by 2030, linked oral health to climate resilience and sustainability, and emphasised multi-sectoral approaches, including taxation of sugar-sweetened beverages, regulation of tobacco and alcohol, and environmental sustainability in dental services.[214] The declaration stressed that oral health is not only a health outcome but a determinant of overall well-being, social participation, and economic development.

India's oral health challenges intersect with the Bangkok Declaration's targets in critical ways. High consumption of free sugars—averaging 19.5 g/day among urban children—combined with widespread tobacco use (28.6% of adults) fuels oral disease prevalence.[42] Climate considerations are increasingly relevant, with dental facilities contributing to biomedical waste and carbon emissions. Integrating oral health into India's National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD), implementing fiscal measures such as sugar taxation, and promoting sustainable dental care practices (e.g., reduced reliance on single-use plastics) would align national action with the declaration's global vision.[42, 214]

FDI–IADR Advocacy Priorities (2025)

In 2025, the FDI World Dental Federation and International Association for Dental Research jointly advanced a set of advocacy priorities positioning oral health as a human right. These priorities called for inclusion of oral health in all UHC benefit packages, explicit recognition in NCD strategies, increased investment in research, and strengthening of the oral health workforce.[215] They underscored the need for robust financing models, digital innovations for service delivery, and equity-driven policies to reach underserved populations.

In India, these priorities directly address the persistent exclusion of oral health from Pradhan Mantri Jan Arogya Yojana (PM-JAY) benefits, except for limited surgical interventions. Expanding coverage to preventive and basic restorative services would improve equity and reduce long-term treatment costs. India's research capacity in oral health remains underfunded, with few multi-centre studies guiding policy. Digital innovations, such as teledentistry platforms, could bridge rural access gaps. Embedding oral health into NCD and UHC frameworks at both policy and operational levels would be consistent with FDI–IADR recommendations and help achieve sustainable improvements in population oral health.[42, 215]

Recommendations

Drawing from the four global policy milestones and the Indian epidemiological profile, the following actions are recommended to accelerate oral health integration into India's Universal Health Coverage (UHC) agenda:

Policy Integration and Governance

1. Include oral health explicitly within National Health Policy updates and integrate measurable oral health indicators into the National Health Mission (NHM) and Ayushman Bharat frameworks.
2. Institutionalise oral health governance through a National Oral Health Cell under the Ministry of Health and Family Welfare, with representation from public health dentistry, epidemiology, and community medicine.
3. Align national oral health goals with the WHO Global Oral Health Action Plan 2023–2030 to ensure international benchmarking and accountability.[3, 214, 215]

Strengthening Primary Healthcare Delivery

1. Implement the Basic Package of Oral Care (BPOC) in all Health and Wellness Centres (HWCs), covering emergency pain relief, preventive fluoride applications, atraumatic restorative treatment (ART), and oral hygiene education.[3]
2. Train ASHA workers, ANMs, and primary care nurses in basic oral health assessment, prevention, and referral to dental specialists.
3. Establish referral linkages between primary care facilities and district hospitals or dental colleges for timely management of complex cases.[216]

Workforce Development and Task-Sharing

1. Address rural–urban disparities in dental workforce distribution by introducing rural service bonds and incentives for dental graduates to work in underserved areas.
2. Develop a cadre of mid-level oral health providers (dental therapists, hygienists) authorised to deliver preventive and basic restorative services in community settings.[217]
3. Incorporate oral health competencies into the training curricula of all primary healthcare providers.[216]

Surveillance, Research, and Monitoring

1. Integrate oral health indicators into the Health Management Information System (HMIS), enabling routine data collection on disease prevalence, treatment uptake, and service gaps.[216]
2. Conduct periodic national oral health surveys every five years to monitor trends and evaluate programme effectiveness.[3]

3. Encourage operational research on cost-effective prevention strategies, digital dentistry applications in rural outreach, and climate-resilient oral health care.[216]

Health Promotion and Disease Prevention

1. Embed oral health messages into tobacco cessation services under the National Tobacco Control Programme (NTCP) and nutrition interventions under Poshan Abhiyaan.[143]
2. Implement school-based daily supervised toothbrushing programmes with fluoridated toothpaste in high-prevalence districts.
3. Enforce sugar reduction policies in line with WHO recommendations to curb dietary risk factors for dental caries.[3, 214]

Financing and Sustainability

1. Include essential oral healthcare services in the PM-JAY (Ayushman Bharat) benefits package, prioritising preventive and early intervention services.
2. Mobilise public–private partnerships with dental colleges, NGOs, and corporate CSR funds to expand community outreach.
3. Secure dedicated oral health budget lines within state and central health allocations to ensure programme continuity.[215, 216, 218]

The convergence of global oral health policy milestones between 2021 and 2025 represents an unprecedented turning point in how oral health is perceived, prioritized, and integrated within health systems.

The WHA74.5 Resolution provided the first unified political commitment, acknowledging oral diseases not as isolated dental concerns but as major public health conditions sharing risk factors with non-communicable diseases, requiring system-wide preventive approaches.

The WHO Global Oral Health Status Report offered irrefutable epidemiological evidence and economic rationale, revealing that untreated dental caries alone affects over 2.5 billion people worldwide, with LMICs such as India bearing a disproportionate burden.

The Bangkok Declaration translated these commitments into urgent, actionable targets for 2030, embedding oral health within Sustainable Development Goal frameworks and highlighting its intersection with equity, poverty alleviation, and climate resilience.

Finally, the FDI–IADR Advocacy Priorities reframed oral health as both a human right and a neglected pillar of NCD prevention, demanding its inclusion in global and national financing, surveillance, and policy mechanisms.

For India, these global commitments are neither abstract nor aspirational—they directly address the country's entrenched challenges. National data from the WHO Country Profile reveal alarming prevalence rates: 44% of 5-year-old children with untreated caries, 19% of adults with severe periodontal disease, and 16% edentulism in seniors.

Service coverage remains limited, with over 70% of dental care expenditure paid out-of-pocket, creating financial barriers that exacerbate inequities. Rural–urban disparities in dentist distribution, absence of a national oral health surveillance system, and limited integration with primary healthcare delivery mechanisms collectively perpetuate the cycle of preventable disease and disability.

Aligning India's oral health strategy with these global milestones demands a paradigm shift—from a curative, urban-centric model to a prevention-oriented, universally accessible, and equity-focused system. This transformation will require integrating a Basic Package of Oral Care (BPOC) into all Health and Wellness Centres, establishing costed national action plans with measurable targets, and embedding oral health indicators into the National Health Mission's monitoring frameworks.

Fiscal policies—such as sugar taxation, tobacco control enforcement, and incentives for rural dental service provision—must complement clinical interventions. The workforce must be expanded and redistributed through targeted deployment, mid-level provider training, and interprofessional collaboration.

Importantly, oral health integration into UHC in India is not merely a technical reform—it is a moral imperative. Neglecting oral health perpetuates health inequities, undermines quality of life, and imposes substantial economic losses through reduced productivity and increased treatment costs.

Conversely, embracing the WHA74.5 framework, operationalising GOHSR recommendations, implementing the Bangkok Declaration's 2030 targets, and adopting the FDI–IADR advocacy priorities would position India as a global leader in equitable, sustainable oral healthcare. This alignment would not only improve oral health outcomes but also advance broader national and international health and development agendas, contributing to the achievement of multiple SDGs.

In conclusion, the coming decade offers India a rare window of opportunity to translate global consensus into national transformation. By embedding oral health into UHC, prioritising prevention, and addressing systemic inequities, India can ensure that oral health is no longer the "silent epidemic" but a fully recognised, resourced, and integral component of comprehensive healthcare. The pathway is clear, the evidence is compelling, and the urgency is undeniable—what remains is the sustained political will, coordinated action, and investment to make universal oral health coverage a reality by 2030.

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CHAPTER

13

Conclusion

India can no longer afford to look away. This book, HOPE-IN: Holistic Oral Health Prioritisation and Equity through Integration with National Health Programs of India, has laid bare a truth: oral diseases are silently consuming the health of the nation. They are not minor ailments, but a public health emergency, cutting across every age, gender, and socioeconomic group.

There is a wide pool of health programs in India that focus on general health, as described in this book, but this does not mean that oral health is of lesser importance—rather, it is often overlooked simply because it is not perceived as a matter of urgency.

The world has already sounded the alarm. The WHO Global Oral Health Report (2022) revealed that 3.5 billion people—nearly half the planet—suffer from oral diseases, more than all other non-communicable diseases combined. India, with its vast population and stark inequities, carries one of the heaviest burdens. Behind every untreated cavity, every missed diagnosis of oral cancer, every child who cannot eat properly, and every elder who loses the ability to speak with dignity are some systemic gaps which needs to be worked upon. Government of India is investing in healthcare which is commendable but due to economic burden but it is undeniable that it is difficult to cater such larger population as in India. Therefore, the integration that we purpose is to bring down the economic burden of diseases by combining the workforce and treat people better.

We cannot continue with fragmented reforms. Oral health must be integrated into every pillar of national health—maternal and child care, nutrition, school health, non-communicable disease prevention, tobacco control, and geriatric care. Anything less will perpetuate injustice, deepen inequity, and deny millions their rightful chance at health.

The path forward demands political will, restructured financing, and empowered public health dentistry. It calls for leadership that values prevention over cure, and systems that bridge the rural–urban chasm rather than widen it. If ignored, the consequences will not be silent—they will echo for generations.

This is no longer a matter of academic debate. Oral health is not separate from

general health—it is its mirror. The evidence is here. What India needs now is action—bold, systemic, and immediate.

Beyond today's policymakers and practitioners, this book carries a deeper purpose: to empower the future generation of dentists. It seeks to give them clarity on where to focus their energy, which gaps to bridge, and how to transform dentistry into a true instrument of public service. For every Indian who deserves to smile without pain, this is our collective responsibility.

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HOPE-IN:

Holistic Oral Health Prioritisation and Equity
Through Integration with National Health Programs of India

About The Book

This book provides a concise overview of oral health from a public health perspective, synthesising current scientific evidence and policy frameworks. Rather than viewing oral health as a standalone or specialty issue, it positions oral health as an essential component of general health and public health systems. The book critically examines how oral health priorities can be aligned with existing national health programmes, prevention strategies, and equity-focused policies in India. Intended for dental professionals, public health practitioners, researchers, students, and policymakers, it supports evidence-informed decision-making to improve oral health outcomes. By integration instead of isolation, the book presents a framework that encourages sustainable action, strengthens health systems, and advances oral health equity at the population level.

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