

# Addressing oral health disparities, inequity in access and workforce issues in a developing country

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**Abstract:** The health sector challenges in India like those in other low and middle income countries are formidable. India has almost one-third of the world's dental schools. However, provisions of oral health-care services are few in rural parts of India where the majority of the Indian population resides. Disparities exist between the oral health status in urban and rural areas. The present unequal system of mainly private practice directed towards a minority of the population and based on reparative services needs to be modified. National oral health policy needs to be implemented as a priority, with an emphasis on strengthening dental care services under public health facilities. A fast-changing demographic profile and its implications needs to be considered while planning for the future oral health-care workforce. Current oral health status in developing countries, including India, is a result of government public health policies, not lack of dentists. The aim of the article is to discuss pertinent issues relating to oral health disparities, equity in health-care access, dental workforce planning and quality concerns pertaining to the present-day dental education and practices in India, which have implications for other developing countries.

**Key words:** Dental care delivery system, dental education, oral health disparities, access disparities, quality dental education, dentistry in developing countries

India is a land of diversity in race, region, caste and language and known for its rich heritage and glorious past. It is the seventh largest country of the world and situated in the Asian subcontinent, bordered by Pakistan to the west, China and Nepal to the north and north-east, Bhutan in the north east and Burma to the west. This article primarily assesses the practice of dentistry in India, from its inception to the present day. Recent demographic profiles, trends in oral health and pertinent policy subjects are discussed relating to oral health disparities, equity in oral health-care access, dental workforce planning and quality issues pertaining to present-day dental education and practices, and their future implications.

## DEMOGRAPHICS

The Indian population has risen from 850 million in 1990 to 1.1 billion in 2011, with a population growth percentage remaining at 1.4%. Already containing 18.5% of the world's population, India is projected to overtake China as the world's most populous nation by 2030. The proportions of urban and rural population in India are 31.2% and 68.8%, respectively. The

level of urbanisation has increased from 27.8% in 2001 to 31.2% in 2011. More than 50% of India's population is below the age of 25 years and more than 65% is below the age of 35 years. Literacy is one of the main foundations for social and economic growth, and India's literacy rate has shown a significant increase in the past 10 years. According to the 2011 census, the literacy rate is 74.0%. Female literacy levels are 65.5% while the male literacy rate is over 80%. The youth literacy rate is about 9% higher than the adult literacy rate<sup>1</sup>.

## HISTORICAL BACKGROUND

The Indus valley civilisation has yielded evidence of dentistry being practiced as far back as 7000 BC. This form of dentistry involved curing tooth-related disorders with hand-operated bow drills. These would-be dentists were master beadmakers who used bow drills to cure tooth problems. The reconstruction of this ancient form of dentistry showed that the methods used were reliable and effective<sup>2</sup>. A Sumerian text from 5000 BC describes a tooth worm as the cause of dental caries. Evidence of this belief has also been

found in ancient India, Egypt, Japan and China<sup>3</sup>. Numerous descriptions of severe periodontal disease with loose teeth and purulent discharge were mentioned in 1000 BC in the Sushruta Samhita<sup>4</sup>. Charaka during the same period stressed tooth brushing using neem twigs. It was advocated that the stick for brushing be bitter, pungent or astringent. One of its ends should be chewed in the form of a brush and be used twice a day, taking care that gums are not injured<sup>4</sup>. This was long before the introduction of the toothbrush in the Western world (1640) and before the idea of the toothbrush as formulated in China (late 1400s). However, thereafter, for millennia dentistry remained in darkness as the Brahmins of ancient India abhorred touching flesh, blood and pus. Scientific dentistry was reintroduced in India in the 19th century by the British and Dr Raifuddin Ahmed established the first dental college in 1920.

## CURRENT SCENARIO

India has 295 dental colleges, almost one-third of the world's schools. Annually, more than 30,000 dentists graduate in India and more than 4,000 specialists graduate each year<sup>5</sup>. There is a total workforce of approximately 200,000 dental practitioners in India at present, which is expected to soon swell to 350,000. Of the 292 dental schools, only 38 are public schools, the rest being private. The private sector in undergraduate dental education in India has grown significantly over the years in terms of numbers of institutions and currently accounts for 95% of undergraduate enrolment capacity. It also accounts for 95% of all postgraduate dental education enrolment capacity, despite starting from negligible levels in the 1960s<sup>6</sup>. Dentistry in India has come a long way from the ancient Indus valley civilisation to the age of scientific and evidence-based dentistry.

The Indian dental education sector provides training at the undergraduate and postgraduate levels. The first degree, BDS (Bachelor of Dental Surgery), comprises undergraduate training of 4 years, followed by 1 year of mandatory internship. The curriculum, prescribed by the Dental Council of India, a statutory body comprising dental health professionals, supports basic training in most major areas of dental care and is also the prerequisite for further training in residency education. Nine specialty levels of training offered at postgraduate level include conservative dentistry and endodontics, paedodontics, periodontics, public health dentistry, prosthetic dentistry, oral surgery, oral medicine and radiology, oral pathology and orthodontics. In addition, there are 2-year certificate/diploma courses that are offered for auxiliary training, such as dental mechanics (dental laboratory technology), dental hygiene and dental assistance.

## TRENDS IN NATIONAL ORAL HEALTH

### Dental caries

Dental caries has been consistently increasing in both prevalence and severity over the last five decades. In 1941, its prevalence was reported as between 40% and 50%, with an average DMFT (Decayed, Missing, Filled Teeth) of 1.5. Between the 1950s and 1970s the prevalence ranged from 50% to 70%, with an average DMFT of 1–3. In 1980s the prevalence increased to about 80% in children with an average DMFT of 2–5<sup>7</sup>. As per World Health Organisation (WHO) oral health surveillance 1992, the DMFT index in 12-year-old Indians was 0.89 while in 1996 the prevalence was 89%, with DMFT ranging from 1.2 to 3.8<sup>8</sup>. A national survey (2002–2003) was conducted to determine the prevalence of dental diseases in different states of India. It found that the prevalence of dental caries was 40–80% and provision for restorative treatment was inadequate in most parts of the country<sup>9</sup>.

### Periodontal disease

Periodontal disease rates as high as 99.4% in school children were reported during the 1940s and 1950s. The reported prevalence among 12-year-olds ranged from 35% to 100% between the 1960s and 2000<sup>7</sup>. Shah<sup>10</sup> reported that 100% of adults above 60 years had periodontal diseases and of these 71.9% had severe periodontal disease. The national oral health survey reported that periodontal diseases increase with age and were notable more in rural areas; the prevalence ranged from 95% in the geriatric age group to 60% among 12-year-olds. It is widely accepted that periodontal disease affects over 90% of the Indian population, but the majority may have only mild gingivitis and bleeding from gums, which is reversible with proper oral hygiene measures. More advanced periodontal disease with pocket formation and bone loss, which could ultimately lead to tooth loss if not treated properly, may affect 55–60% of the population<sup>9</sup>.

### Oral cancer

Oral malignancy is the commonest type of cancer accounting for 40% of all Indian cancers. Between 1911 and 1970 there was a steep decline in mortality for oral cancers<sup>7</sup>. The incidence of mortality has begun to increase again, particularly in young men and women. Oral cancer and precancerous conditions were 3–10% in 2002–2003, as reported in a National oral health survey (the highest rate, 7%, was in Orissa, which is also the world's highest rate)<sup>9</sup>.

## Rural population

According to the WHO, the provisions for oral health-care services are few in rural parts of India where the majority of the Indian population resides. This is further complicated by the great variation that occurs across this population in social parameters such as income and education. The prevalence of periodontal disease and dental caries in 1986 was found to be low in rural areas of Delhi despite a perfunctory oral health-care system with no fluoridation of water supply. Mean reported dmft/DMFT values for tribal children were between 0.5 and 1.2<sup>11</sup>. Similar low dmft/DMFT scores were reported in 1993 for tribal school children of Wardha and Mandu districts<sup>12,13</sup>. These findings could be attributed to the simple, coarse and traditional fibrous food consumed by the rural and tribal population. In 2011, high sugar consumption, poor oral hygiene and untreated dental disease were noted among 5- and 12-year-old tribal children in Udupi district, Southern India<sup>14</sup>. A striking feature of this study was that none of the children in either age group had visited trained health personnel or a dentist for dental treatment<sup>14</sup>.

The analysis mainly focuses on 12-year-olds because they are the most commonly studied age group for the purpose of comparative dental epidemiology. From the above-mentioned prevalence studies it may be argued that no significant improvement in the oral health status of the Indian communities has been noted over the years. However, a deterioration of oral health has been reported in many of the urban, rural and tribal Indian communities. Disparities in oral health status between the urban and rural areas has remained the same or further broadened. This mainly points towards the emergence of risk factors in the areas which previously were not exposed to these factors.

## STATE OF AFFAIRS IN INDIA

### Existing health-care infrastructure

India consists of 28 states and seven union territories. The principal unit of administration in a state is a district, which is further divided into community development blocks. There are 4,535 such blocks in India, each of which caters to a population of 80,000–120,000<sup>15</sup>. Each block has 30 beds and specialists in surgery, medicine, obstetrics, gynaecology and paediatrics, with one operating theatre, X-ray room and laboratory facilities. These community health centres have one post for a dental surgeon but none for a dental specialist. These blocks serve as referral centres for four primary health centres. This kind of care is generally provided in district hospitals

and community health centres (CHCs), which also serve as the first referral level (secondary care level).

Health services in rural areas are administered through the primary health centres (PHCs), one in each block. These PHCs meet the needs of 20,000–30,000 people. The PHC occupies a key position in the nation's health-care system and is the first level of contact of individuals with the national health system. As a level of care it is close to the people, and where most of their health problems can be dealt with and resolved. It aims to provide preventive, promotive and curative health care services to the people living in a defined geographical area. The sanctioned strength for each PHC is one medical officer, one staff nurse, one pharmacist, two health educators (advisers), two health assistants, one laboratory technician and two auxiliaries. There are no set criteria for posting a dentist at the primary level (PHCs). There are four to six beds for patients. Each PHC further has eight to ten subcentres, each responsible for providing health services to 3,000–5,000 people. These subcentres are the most direct contact points between the primary health care system and the community. Each is administered by one multipurpose worker (male), one multipurpose worker (female) and one lady health visitor who is responsible for six subcentres. As of March 2010 there were 147,069 subcentres, 23,673 PHCs and 4,535 CHCs functioning in India. At the national level, there is a significant increase of 437 PHCs and 1,189 CHCs in 2010 as compared with 2005<sup>15</sup>.

### Health-care expenditure

The health sector challenges in India, similar those in other low and middle-income countries, are formidable. Public spending on medical, public health and family welfare in India is much below what is required. There is no specific separate allocation for oral health in the Indian budget. The low levels of spending have had an adverse impact on the creation of a preventative health infrastructure. Between 1996–1997 and 2005–2006, total government spending on health was stagnant at about 1% of gross domestic product (GDP). Despite efforts to increase public spending after 2005–2006, the expenditure increased only marginally to 1.2% of GDP in 2009–2010 resulting in poor quality of preventive care and poor health status of the population<sup>16</sup>.

### Inequity of access

The distribution of dental professionals across geographical regions is also crucial for ensuring equality in physical access to oral health care. The WHO recommends a dentist to population ratio of 1:7500. The dentist to population ratio of India, which was

1:300,000 in the 1960s, now stands at 1:10,000<sup>17</sup>. When dental professionals are disproportionately allocated to the private sector relative to a public sector that provides subsidised services, financial affordability also becomes a barrier in the care of the less well off.

The dentist/population ratio in India clearly indicates that there is a major rural and urban divide in the availability of dentists in India as the dentist to population ratio is 1:250,000 in rural areas<sup>17</sup>. Dental diseases in rural India primarily result from socio-cultural factors, such as inadequate or improper use of fluoride products and a lack of knowledge about oral health and hygiene, but also result from systemic infrastructure deficiencies that prevent proper screening and dental care to avoid these diseases. Disparities in unmet dental needs generally parallel disparities in disease occurrence and extent. As noted in earlier discussion, there are no posts for dental surgeons in rural PHCs and there are no provisions for oral health care, including preventive care, for the rural population, where the majority (68.8%) of the Indian population resides.

### Poor job prospects

Dental schools flood India with new BDS graduates facing poor job prospects. As discussed earlier, the 292 dental schools graduate approximately more than 30,000 students each year. They earn an average salary in the private sector of 5000 Rupees per month (about US\$100). Government salaries are better, but job opportunities few. Many fresh BDS graduates are opting for better-paying but hard to find jobs as tutors, medical transcriptionists and in health insurance agencies. Graduates are demonstrating a growing dissatisfaction with the profession because of a lack of job opportunities<sup>18</sup>. The end of the 20th century and the beginning of the 21st century saw an increase in the number of enrolments, but now a reduced number of people are entering these colleges as the rapid growth in the number of dentists tend to discourage candidates who feel that the increased competition would limit their future earnings<sup>19</sup>.

### Quality of dental education

A report of the comptroller and auditor general of India, recently tabled in parliament, has exposed the state of dental education in India and come down heavily on poor administration. The report shows how the Dental Council of India (DCI), which is a statutory and recommendatory body to the Ministry of Health and Family Welfare, has failed to manage dental colleges effectively. According to the report, the DCI has failed to conduct regular inspections, which it is supposed to carry out in order to ensure continued maintenance of minimum standards in dental educa-

tion. The review between 2006 and 2011 comprising an audit of 82 dental colleges approved during the period by the Health Ministry showed that 13 of these colleges (15.85%) were granted permission to set up despite negative recommendations of the DCI<sup>20</sup>. This unrestrained and unplanned increase in dental schools is posing a significant challenge to the quality of dental education. Urban Indians are becoming aware of and are beginning to question the quality of the dental schools. Potential dental students are starting to have second thoughts about investing considerable time, effort and financial resources in studies that apparently cannot deliver adequate results and a promising future. Increasing difficulties in finding jobs have led to a lower demand for places in dental schools.

### COGNISANCE AND IMPLICATIONS OF THE EXISTING HEALTH POLICY

Disparities in oral health status exist in developing countries, specifically in urban and rural areas. A recent planning commission study highlighted that India is still short of 200,000 dental surgeons. However, is there really a shortage of dentists in India? Hypothetically, if an assumed shortage does exist then why do so many dental seats go vacant each year and why are a number of graduates each year forced to change profession? Opening dental schools and training additional health-care providers is the current practice in India but in South American countries this approach proved disappointing as there was little improvement in the oral health of the population. Graduates have demonstrated growing dissatisfaction about the lack of job opportunities. Many potential graduates have entered other professions and many dental schools have closed<sup>21</sup>.

A proper understanding and a correct rationale are necessary before finding an answer to the problem. A classic study by Nadanovsky & Sheiham<sup>22</sup> showed only a 3% reduction in cavity levels in 12-year-old children with improved access to the oral care, but a 65% reduction as a result of macro-social factors, including the public health policies. In Brazil, the DMFT index fell from 6.65 in 1986 to 2.79 in 2003, a reduction of 58%. In the same period, children with zero DMFT increased from 3.7% to 31.1%<sup>23</sup>. In December, Brazil included an 'oral health-care strategy' in the family health programme, which has deployed 18,480 staff to promote health care for poor families. The number of dentists in Brazil has reached nearly 220,000, most of them (70,000) employed by the federal government in the public health system<sup>24</sup>.

Oral health policy was drafted by DCI in 1985. It recommends dentists be appointed at PHCs and CHCs<sup>25</sup>. To date, the policy has not been implemented and oral health has not been included in public health policies. Implementation of the policy could

have brought an improvement in the oral health status of the rural population, a reduction in differences in oral health status between urban and rural areas and a reduced dissatisfaction among the dental community by creating new jobs.

The issue of accessibility to quality higher education also needs to be addressed. Accreditation of universities and dental schools is an ongoing, cyclic and voluntary process. Accreditation is an important part of the answer to the quality issues and its consequences<sup>26</sup>. Accreditation needs to be made mandatory by the DCI, as recommended by many other agencies.

## CONCLUSION

National oral health policy needs to be implemented as a priority, with an emphasis on strengthening dental care services within public health facilities, specifically in rural areas. Current oral health status in developing countries, including India, is a result of government public health policies and not a lack of dentists. The present unequal system of mainly private practice directed to a minority of the population and based on reparative services needs to be modified. Provision of dentists at PHCs to cater for the oral health needs of the rural population is key. The fast-changing demographic profile and its implications needs to be considered when planning for the future oral health-care workforce.

The dental industry in developing countries holds tremendous potential. With increased awareness and increasing disposable incomes there is likely to be an increase in demand for dental care. The number of dental schools and the vast workforce created with the help of a healthy policy may create an ideal environment that not only will assist in improving the oral health status of the country but also place it among the leaders of the health-care industry.

## Conflict of interest

None declared.

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