

# Content Analysis of Oral Health Information in Science Textbooks: A Cross-sectional Study in State Boards of Northeast, India

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## ABSTRACT

**Background:** In wealthier countries, the World Health Organization's (WHO) global plan for the promotion of oral health resulted in tremendous progress, but the situation is gloomy among deprived populations due to gaps in program implementation. One such neglected region is Northeast India.

**Aim:** To perform a content analysis of the information on oral health in Science textbooks of standard I–X among state boards in Northeast India.

**Materials and methods:** In Northeast India, a cross-sectional study was undertaken among seven different state boards. To get the needed number of states, convenience sampling was utilized. An assessment instrument of oral health-related key components was used to conduct content analysis for various standards based on content, extent, and evidence. Microsoft Excel 2013 was used to conduct a descriptive analysis of the data.

**Results:** The study was completed in all seven state boards. A total of 124 pages in total were analyzed (243 oral health messages and 55 pictures). The highest percentage of core components (5) were found in VII standard textbooks of Mizoram (i.e., 100%), and 40% of core components were present in textbooks of all other states except Nagaland, where 0% of core components were seen.

**Conclusion:** The Science textbooks of state boards of Northeast India need to be improvised since there is a massive lack of content related to oral health.

**Keywords:** Content analysis, Health messages, School textbooks.

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## INTRODUCTION

Oral diseases such as dental caries and gingival diseases affect about 80% of school-going children worldwide.<sup>1</sup> WHO has focused and prioritized community-based preventive oral health promotion activities over the general therapeutic approach to address the worldwide burden of oral illnesses.<sup>2,3</sup> Northeast India is an example of a marginalized region. Northeast India's oral health is dire, yet behavioral data is in little supply, making it difficult to organize and evaluate health promotion activities. Oral health issues have a direct or indirect detrimental impact on one's quality of life.<sup>4</sup> It impairs speech, self-esteem, and daily activities, but because it makes it painful to eat normally, it also causes underweight youngsters to have aberrant cognitive development.

The literature in Northeast India is replete with information about the high frequency of dental caries and substance usage, particularly cigarettes, among children and adolescents.<sup>5</sup>

India is already witnessing a transforming stage with the introduction of the New Education Policy of India 2020 (NEP 2020) 2020 which emphasizes early childhood care and education. School-based health education is effective in broadening knowledge and fostering the attitudes necessary for healthy behavior. School textbooks also are the cornerstone of education and hence the material included inside them must be correct. The monitoring of information related to oral health in government school Science textbooks in Northeast India will provide a deeper insight into this region and may aid public administrators in the formulation of oral health-related messages policies, as well as

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behavioral modification techniques which can benefit remote areas like Northeast India more effectively.

## MATERIALS AND METHODS

A cross-sectional study was conducted to perform the content analysis of the oral health information in Science textbooks. The study was conducted from September 2021 to January 2022. For this study, seven state boards (Assam, Mizoram,

Nagaland, Meghalaya, Manipur, Arunachal Pradesh, and Tripura) were selected. The sample size was calculated by convenience sampling.

The outbreak of the coronavirus disease 2019 (COVID-19) pandemic was critical for everyone. It had an impact on the worldwide market, mental health, the economy, and education as well. Schools were hampered due to the COVID-19 outbreak, so all classes were held online. The government made all textbooks publicly available online, which can be downloaded from mobile apps such as DIKSHA, State Board Books, and many other online sites that can be simply downloaded for free. As a result, the list of all school textbooks was compiled using these resources. Because textbooks for state boards in Northeast India are primarily published by a single publishing house, state board E-books that are available online or through apps were chosen for content analysis.

English medium school textbooks representing the respective board were the inclusion criteria. The analysis was divided into three parts: content assessment, extent, and evidence. Assessment of the content was done according to the various core components mentioned for the specific standards, respectively, that is, I, II–IV, V–VI, VII–VIII, and IX–X, based on Kasey’s examples of age-appropriate dental subject material.<sup>6</sup> The content outcome was marked as either present or absent based on the core components. The extent was determined by counting the number of messages and images for each standard’s core components. Each book was thoroughly viewed. The investigator then took screenshots of book pages containing information about dental health, pictures, and any activity. The investigator took the screenshot printouts

and highlighted the needed information in red. The number of statements and photographs was recorded. One health message was regarded to be one sentence. The basic core component evidence for each standard was documented as correct or incorrect. For evidence evaluation, the author (Jean N Murry) examined the statements related to oral health and determined whether or not each piece of information was correct or erroneous based on her knowledge. Analysis was performed by the author (Jean N Murry), and the results were double-checked by the other two investigators (Sathyajith Naik N) and (Shivangi Sharma) (Table 1).

### Statistical Analysis

Each board’s data (total page count, health message presence or absence, message extent, and scientific evidence) was entered into a Microsoft Excel sheet. A descriptive analysis was performed (numbers and percentages for the data collected).

### RESULTS

A total of 58 Science textbooks were evaluated for the study. The following is a content analysis of core components for each standard—for standard I—of the two core components (oral hygiene and dentist visit/dentist role); no core components were covered in all the states. Similar results were seen in standard II–IV, where out of the four recommended core components (benefits of teeth/diet/oral hygiene/dentist visit/dentist role), no information about oral health was present in all seven states. For standards V and VI, six core components were analyzed (benefits of teeth/oral

**Table 1:** Content analysis assessment tool for each standard’s core components related to oral health

<i>Standard I</i>	<i>Standard II–IV</i>	<i>Standard V–VI</i>	<i>Standard VII–VIII</i>	<i>Standard IX–X</i>
Oral hygiene—to encourage tooth brushing and the importance of baby teeth Keeping the mouth clean, washing and rinsing the mouth	Benefits of teeth—importance of preservation of teeth through proper care	Benefits of teeth—the importance of good dental health to overall physical health	Oral structure—chemical aspects of tooth formation	Oral structure—development of teeth in the embryo and their importance in later life
Dentist role/dentist visit—discuss the role of the dentist	Oral hygiene—keeping teeth clean, rinsing the mouth after eating	Oral structure—introduce tooth structure	Dental disease—emphasis can be made on dental healthcare and the prevention of periodontal disease	Dental disease—scientific causes of dental caries, periodontal disease, sex, and oral cancer Preventive measure—importance of preventive measures
	Diet—simple facts about diet, especially chocolates	Oral hygiene—the importance of proper tooth brushing technique Maintenance of good oral hygiene	Preventive measure Importance of preventive measures fluorides	Diet—the importance of nutrition
	Dentist role/ dentist visit—importance of visit to the dentist	Dental disease—a detailed description of the severity of dental problems.  Diet—information about diet  Dentist role/dentist visit—the importance of dental care	Diet—distinguish between facts and fads in nutrition Scientific studies on nutrition  Tobacco—information about the ill effects of tobacco	Tobacco—tobacco use’s consequences, influences/social norms The reason behind smoking Life skills and resistance  Mass media—evaluate mass media information and interpret research findings  Dental care—adult attitude toward dental care

structures/oral hygiene/diet/ dental disease/dentist role). For standard V, only one core component, that is, the oral structure, was covered by the state boards of Assam and Arunachal Pradesh. For standard VI, there was an absolute lack of oral health information in all the states. The highest percentage of core components (5) were found in VII standard textbooks of Mizoram (i.e., 100%), and 40% of core components were present in textbooks of all other states except Nagaland, where 0% of core components were seen. Seven core components (oral structure, dental disease/ tobacco/ preventive measure/ diet/mass media/dental care) were assessed for standards IX and only Nagaland, Assam, and Arunachal Pradesh state boards covered two components for standards IX. In standard X, three out of seven core components were covered in Manipur state board books, two in Meghalaya and one in Nagaland, while none were covered in Mizoram, Assam, Tripura, and Arunachal state board books. Table 2 shows these data.

The following are the findings concerning the extent of oral health messages and pictures—a total of 243 messages and 55 images about dental health were obtained. Standards I and II lacked any pictures or messages on dental health. Tripura's state board textbooks contained one oral health message and six pictures, but none in the remaining states for standard III.

For standards IV and V, only one picture related to oral health was observed in Tripura and Assam state boards. Arunachal Pradesh comprised four messages and one image. Zero messages and pictures were observed in VI standard textbooks.

The maximum number of messages and pictures related to oral health was seen in VII standard Science textbooks of Assam and Arunachal Pradesh, followed by Mizoram, Meghalaya, and Tripura.

For standards VIII and IX, only Tripura, Assam, and Arunachal Pradesh contained some pictures and messages related to oral health. In standard X textbooks, the most extent was noticed in Manipur's state boards, which had 25 messages and three pictures. The extent of messages related to oral health was found to be zero from standard I–VIII in the state board of Nagaland. Table 3 depicts these data.

## DISCUSSION

Dental camps have always been the traditional method of preventing dental diseases. According to the Cochrane review, the results, however, are doubtful because it is impossible to analyze a huge population, particularly India. An alternate method of preventing dental diseases is through school-based education using information given by teachers and textbooks.

School dental health education strives to improve children's oral health knowledge, attitudes, and behaviors.<sup>7,8</sup> Individuals spend the majority of their childhood and teenage years in school. This is a crucial phase in a person's life when behavior patterns are developed that may reflect their future health status. Furthermore, at this age, toddlers may learn new information quickly. The earlier habits are created, the greater the influence.

**Table 2:** Content analysis of each standard's core components

Standard	No. of core components	Nagaland	Mizoram	Manipur	Meghalaya	Assam	Tripura	Arunachal Pradesh
		Core components present						
I	2	0	0	0	0	0	0	0
II	4	0	0	0	0	0	0	0
III	4	0	0	0	0	0	0	0
IV	4	0	0	0	0	0	0	0
V	6	0	0	0	0	1	0	1
VI	6	0	0	0	0	0	0	0
VII	5	0	5	2	2	2	2	2
VIII	5	0	0	0	0	0	0	0
IX	7	2	0	0	0	2	0	2
X	7	1	0	3	2	0	0	0

**Table 3:** Extent of oral health messages

Standard	State board													
	Nagaland		Mizoram		Manipur		Meghalaya		Assam		Tripura		Arunachal Pradesh	
	Message	Picture	Message	Picture	Message	Picture	Message	Picture	Message	Picture	Message	Picture	Message	Picture
I	0	0	0	0	0	0	0	0	0	0	0	0	0	0
II	0	0	0	0	0	0	0	0	0	0	0	0	0	0
III	0	0	0	0	0	0	0	0	0	0	1	6	0	0
IV	0	0	0	0	0	0	0	0	0	0	0	1	0	0
V	0	0	0	0	0	0	0	0	0	1	0	0	4	1
VI	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VII	0	0	29	4	32	4	14	3	37	5	4	2	37	5
VIII	0	0	0	0	0	0	0	0	0	0	1	2	0	0
IX	9	10	0	0	0	0	0	0	23	3	0	0	22	3
X	2	1	0	0	20	3	8	1	0	0	0	0	0	0

Total oral health messages—243 and 55 pictures



According to studies, a school-based oral health education (OHE) program significantly reduces the rate of untreated dental caries, and OHE is most beneficial when provided at a younger age.<sup>9</sup> OHE programs implemented in schools in Brazil,<sup>10</sup> Madagascar,<sup>11</sup> and Indonesia<sup>8</sup> had outcomes that were similarly positive. Therefore, it is necessary to examine the knowledge the kids are receiving, which is primarily from their teachers and schoolbooks.

It is a well-known fact that textbooks are the main source from which students absorb information; in other words, how the material is written in the textbook determines how the material is learned by students. The effectiveness of school textbooks can be assessed by conducting a content analysis of the books' content.

The content of school textbooks has frequently concentrated on acquired immunodeficiency syndrome, communicable viral and bacterial infections, cancer, skin diseases, deficiency diseases caused by malnutrition, and vitamin deficiencies. Only five research<sup>7,12-15</sup> on content analysis related to oral health have been reported in the literature, with only two studies done by Geetha Priya et al.,<sup>7</sup> and Dagar et al.,<sup>15</sup> focusing on overall content about oral health, and the remaining three studies focusing on one topic such as nutrition, oral cancer, and tobacco use.

The purpose of this study was to undertake a content analysis of the information on oral health in Science textbooks for grades I–X among state boards in Northeast India. This is the first study of its kind, concentrating on seven state boards in Northeast India. This study differs from the two studies cited in the literature by Geetha Priya et al.<sup>7</sup> and Dagar et al.,<sup>15</sup> since these two investigations were limited to one state, namely Tamil Nadu and Pune, respectively.

Several studies have already reported on the significance of OHE for primary school kids,<sup>16,17</sup> and according to the results of these studies, greater knowledge regarding oral health leads to more active behavior regarding oral health among children. Thus, it is necessary to secure OHE in the early stages of childhood.

Studies have reported that topics on OHE should be developed systematically based on grades and should be continuously provided to the students over the long term.<sup>18</sup> However, when it comes to oral health messages, textbooks are deficient in both content and extent, according to the conclusions of this study, even though the evidence is mostly true. The content analysis of core components for each standard is as follows.

For standard I, no content about the core components, that is, oral hygiene and dentist role was covered. Similarly, for standards II–IV, no core components were present in all the state boards. These findings contrast with those of a study conducted in Pune city by Dagar et al. in standards I–V, which found that their textbooks included appropriate information.<sup>15</sup>

For standards V and VI, the core components were covered only to some extent in a few states like Assam and Arunachal Pradesh. The findings contradicted the findings of Dagar et al.<sup>15</sup> According to studies by Saito et al.<sup>14</sup> and de Irala et al.,<sup>19</sup> no information about illness-preventative behavior was provided in the books. Mizoram's state board covered the majority of core components, including oral structure, dental disease, preventive measures, food, and tobacco, and to a lesser level in Manipur, Meghalaya, Assam, Tripura, and Arunachal Pradesh's state boards.

For standard VII, Assam and Arunachal Pradesh state boards had the highest count of messages, followed by the Manipur state Board, and for standard VIII, the Tripura state board had the highest proportion. The findings were similar to those of Saito et al.,<sup>14</sup> de Irala et al.,<sup>19</sup> and Barrio-Cantalejo et al.,<sup>20</sup> who found

that the textbook contained accurate scientific material but lacked information on illness prevention and tobacco usage.

The main components of dental disease, preventative measures, and diet were covered to a certain extent across Manipur, Meghalaya, and Assam boards for standards IX and X, although oral structure, tobacco, mass media, and dental care were not.

For standard IX, the Assam board had the highest proportion of messages, while for standard X, the Manipur state board had the highest proportion, followed by Meghalaya.

The study was carried out in three parts that are content, extent, and evidence; overall, the evidence in this study was correct most of the time. Barrio-Cantalejo et al. reported 100% valid scientific evidence for oral health messages in their content analysis.<sup>19</sup> Furthermore, it appeared that the Nagaland state board books contained the poorest amount of content and showed the same ineptness in providing all facets of oral health.

## LIMITATIONS

One limitation of the study was that only Science textbooks were used for content analysis, even though some content about teeth and oral health maintenance (in the form of a poem or activity) could be found in English and other regional language textbooks and was likely overlooked.

## CONCLUSION

Oral health information is scarce in Northeast India's state Science textbooks, so there is an immediate need to enhance textbook content. Children are regarded as the nation's future; this information could assist the concerned authorities in this region in improving and planning oral healthcare services. Based on the results of the study, the following recommendations are proposed:

- National Education Policy of India 2020 (NEP 2020) should update its textbooks and draw their attention to the paucity of oral health information in textbooks.
- A considerable number of health messages should be included in school texts based on updated evidence that is exclusively written or advised by medical and dental experts.
- Local authorities, nongovernmental organizations, and dental associations should all actively participate in an oral health awareness campaign.
- Information on frequent dental checkups, as well as workshops for school teachers, should be provided so that healthy oral habits and oral hygiene can be reinforced.
- Teachers serve as role models for children, and numerous studies have shown that teachers play an important role in improving children's behavior; therefore, copies of the oral health promotion training manual should be distributed to teachers in order to teach children about the importance of oral health.

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