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ORIGINAL ARTICLE

Oral health status of 916 children in Tibetan settlement (Bylakuppe, India): A cross-sectional descriptive study

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Abstract

Background: Dietary and oral hygiene habits among integrated migrant cultural minorities can vary and could impact susceptibility to caries.

Aim: This study aimed to assess and compare the oral health status of Tibetan schoolchildren living in the Tibetan settlement of Bylakuppe, India, stratified by type of residence.

Design: A descriptive cross-sectional study was conducted among Tibetan schoolchildren attending nine schools in the Bylakuppe region.

Results: The study population consisted of 916 children aged 5–17: 702 (76.6%) living in secular houses (LSH) and 214 (23.4%) living in monasteries (LM). The prevalence of dental caries was 70.9%, and the mean value of decayed, missing, filled teeth for mixed and primary dentition (DMFT*; dmft) of LSH children ($1.56 \pm 2.34/1.74 \pm 2.66$) was higher than of LM ones ($1.14 \pm 2.34/0.83 \pm 2.80$; $p < .001$). DMFT for LM children (1.46 ± 2.04) was slightly higher than for LSH children (1.38 ± 1.96; $p > .05$). Among the sample, 99.1% had a good simplified Oral Hygiene Index (OHI) and LM children showed higher rates of good values (99.5% vs. 98.2% in LSH children). Most children needed preventive/routine dental treatment, whereas 16.6% needed urgent dental treatment. In 4.5% of children, oral mucosal lesions were present.

Conclusion: This study confirms the high need for dental treatment in the children of the Tibetan settlement investigated.

KEYWORDS

Tibetans, socio-economic determinants, prevention, oral health, dental caries, children

1 | INTRODUCTION

The presence of diverse cultural backgrounds among integrated migrants is widely recognized and frequently observed in host countries nowadays.[1] Within these cultural minorities, differences in dietary and oral hygiene habits may arise due to socio-cultural reasons, potentially impacting their susceptibility to dental caries.[2,3] The phenomenon of cultural minorities residing in host countries has garnered significant attention due to its implications for social integration, identity formation and health disparities.[4–6] Understanding the oral health disparities within these communities is essential for implementing targeted interventions and addressing the specific needs of different subgroups.[7] Children's oral health, and particularly dental caries, is of utmost importance, as it impacts their overall well-being and development.[8,9] This study aimed to assess the oral health status among Tibetan children of the settlement in Bylakuppe, India. Besides, this study investigates the differences in oral health between children living in secular houses (LSH) and those living in monasteries (LM), likely related to different habits.[10,11]

Why this paper is important to paediatric dentists

- Focusing on Tibetan children in Bylakuppe, India, this paper underscores the importance of recognizing oral health disparities in cultural minority groups for tailoring interventions and prevention plans.
- The research highlights the influence of socio-cultural factors, including dietary and oral hygiene practices shaped by cultural traditions, on oral health. It shows how different dietary habits, such as high-sugar and predominantly vegetarian diets, may have effects on oral-dental health at least in the studied Tibetan children.
- The study's outcomes offer insights that may stimulate further research in various communities, particularly among ethnic-cultural minorities and stress the value of culturally sensitive preventive programmes and community dentistry initiatives aimed at addressing oral health disparities in diverse populations, ultimately enhancing children's overall well-being.

2 | MATERIALS AND METHODS

The study protocol conformed to the ethical guidelines of the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. A descriptive cross-sectional study was conducted, focusing on both secular and religious Tibetan schoolchildren attending nine different schools from the Bylakuppe region of Mysore District, Karnataka, India. The study spanned a duration of 2 weeks (February 2018).

To ensure adherence to ethical guidelines, we sought approval for the study and necessary permission from the Institutional Board of Tso Jhe Khangsar Hospital Charitable Institute under the Department of Health, Central Tibetan Administration. In addition, consent was obtained from the principals of the respective schools where the study was conducted. Prior oral informed consent was also acquired from the parents of the participating children, who were also informed through public announcements. In the case of children attending residential schools (monasteries), consent was obtained from the head of the institution. The sample is considered representative of the specific Tibetan settlement of Bylakuppe, as no parent or caregiver refused permission for their child to participate in the study, with no dropouts.

The sample was categorized based on residence into two groups: children living in LSH and those living in LM. In addition, the whole sample was further divided into three groups according to age and related dentition: 5 to 6 years old (with primary dentition), 7 to 12 years old (mixed dentition) and over 13 years old (with permanent dentition).

The stratification based on dentition was implemented by the strategies of the World Health Organization (WHO), which utilizes DMFT and dmft assessments in global preventive programmes.[12] These assessments prioritize a comprehensive evaluation of both primary (primary) and permanent dentition, without segmentation by specific age groups. Additionally, the decision to stratify based on dentition was motivated by the need to compare the data with those from prior research conducted on Tibetans of the same age in Bylakuppe.[1,13]

The study protocol comprised two stages. The initial part encompassed a questionnaire addressing oral hygiene practices and demographic information. The second stage involved the oral health assessment to document oral health status and treatment needs. Prior to the commencement of the study, examiners underwent comprehensive training to ensure their calibration. Three investigators (GC, GioC and RM) were standardized and calibrated to enable consistent examination by a panel of experts to ensure similar interpretations of the codes and criteria including the WHO guidelines for recording decayed, missing and filled teeth (DMFT; dmft) indices and the simplified Oral Hygiene Index (OHI) and all other examined oral condition. To develop a consistent approach

to identifying dental caries and oral hygiene conditions, the examiners underwent visual training sessions. This involved reviewing images and case studies of oral health conditions, both in photographs and during live demonstrations, to familiarize them with various clinical presentations. Prior to conducting actual examinations on study participants, the examiners performed a series of examinations on a sample of individuals not included in the study. These examinations were observed and evaluated by a senior dental expert who provided feedback and guidance. All this training, which was supervised by subject experts, ensured that examiners had a deep understanding of the assessment criteria and scoring methods. Intra- and inter-examiner reliability was quantified through the utilization of kappa score statistics, revealing a notable level of concordance: each examiner exhibited a reliability score exceeding 0.8 for the assessments, indicating an excellent degree of agreement and affirming the reliability of the examination process.

During the examination process, the paediatric participants were seated in a stable chair, positioned in an upright posture. The designated examiner, following standardized protocol, was situated directly facing the examinee. Concurrently, a dedicated recorder meticulously documented all pertinent data. Notably, consistent and appropriate artificial lighting conditions were meticulously upheld throughout all examination settings, augmented by optimal natural sunlight exposure and supplemented by the operator's judicious utilization of an overhead light source.

To assess the oral health condition of children, the dmft index was calculated for 5- to 6-year-old children (dmft, for primary dentition) and children over 13 years of age (DMFT, for permanent dentition); for children aged between 7 and 12 years, the sum of these two indices (DMFT*) was used thanks to the assumptions made on dentition depending on age.

The DMFT and dmft indices were recorded according to the WHO Oral Health Assessment form (2013).[14] The OHI was also calculated to complete the assessment of the oral health of the study population[15] and categorized into three levels: good (0.0–1.2), fair (1.3–3.0) and poor (3.1–6.0). The presence of onychophagy was evaluated by anamnesis and direct clinical analysis recording signs and/or consequences of onychophagy, such as nail infections, bleeding or nail deformities. The pre-existing oral treatment in the analysed sample was assessed through anamnesis and clinical evaluation. The assessment of all remaining analysed components of oral health, including treatment needs, dental erosion, dental trauma, and the presence and localization of oral mucosal lesions, was conducted by adhering to and completing the Oral Health Assessment Form (2013).[14]

Statistical analysis was conducted to assess the significance of differences in oral health parameters between LSH and LM children. Statistical tests, such as chi-squared tests, were used to compare means and proportions. *p*-Values were reported to assess the statistical significance of observed differences in the data, with the significance level set at $p < .05$.

3 | RESULTS

Of the 929 children examined, 916 (98.6%) were Tibetan, 11 (1.2%) were Indians, and two (0.2%) were Nepalese. Due to the low number of Indian and Nepalese children, only the Tibetan ethnic group was considered. The study population, hence, consisted of 916 Tibetan children aged 5–17 years, 702 (76.6%) LSH children and 214 (23.4%) LM children. The population was mainly composed of male subjects: 578 (63.1%) were male and 338 (36.9%) were female. All the LM children were male; consequently, considering only the male group, 214 (37%) were LM children. According to age categorization, children were distributed as follows: 78 (8.5%) in the 5- to 6-year age group, 445 (48.6%) in the 7- to 12-year age group and 393 (42.9%) in the 13 years and above age group (Table 1).

3.1 | Oral hygiene habits

Of LSH children, only 145 (15.8%) stated how many times they brushed their teeth per day. The mean value was 1.3 times per day, with a minimum of 0, a maximum of 3 and a median value of once per day. More specifically, 66.2% brushed their teeth once a day, 32.4% brushed their teeth twice a day, 0.7% brushed their teeth thrice a day, and only 0.7% did not brush their teeth.

TABLE 1 Demographic distribution of LM and LSH status among different age groups and gender.

Age	Female, *n* (%)	Male, *n* (%)	LSH, *n* (%)	LM, *n* (%)	Total, *n* (%)
5–6 years	30 (8.9)	48 (8.3)	62 (8.8)	16 (7.5)	78 (8.5)
7–12 years	152 (45.0)	293 (50.7)	332 (47.3)	113 (52.8)	445 (48.6)
≥13 years	156 (46.1)	237 (41.0)	308 (43.9)	85 (39.7)	393 (42.9)
Total, *n* (%)	338 (36.9)	578 (63.1)	702 (76.6)	214 (23.4)	916 (100.0)

Abbreviations: LM, living in monasteries; LSH, living in secular houses.

3.2 | Oral health status

3.2.1 | Caries experience

Of the whole sample, 649 (70.9%) children presented at least one carious lesion (DMFT* > 0), whereas 267 (29.1%) did not have caries (DMFT* = 0). A total of 202 (71.2%) LSH children were caries-free, compared with 65 (30.4%) LM children. The number of LM children with caries (149, 69.6%) was lower than LSH children with caries (500, 71.2%).

The average DMFT for LM children (1.46 ± 2.04) was higher than for LSH children (1.38 ± 1.96; Table 2); this difference was, however, not statistically significant, whereas the average dmft of LSH children (1.74 ± 2.66) was higher than that of LM ones (0.83 ± 2.80) with a statistically significant difference ($p < .001$; Table 2). DMFT* was higher in LSH (1.56 ± 2.34) than in LM (1.14 ± 2.34), and as of dmft index, it showed a statistically significant difference ($p < .001$; Table 2).

3.2.2 | OHI index

Most of the sample (99.1%) exhibited good values of debris and calculus during the examination, with a small percentage (0.9%) showing a fair status. Notably, a distinction was observed between LSH and LM Tibetan children, with LM children demonstrating higher rates of good oral hygiene (99.5% compared with 98.2% in LSH children).

TABLE 2 Decayed, missing and filled teeth index results for children across three distinct age groups.

Variables	LSH ($n = 702$)	LM ($n = 214$)	p-Value
Decayed	1.67 ± 2.56	0.67 ± 2.69	<.001
Missing	0.04 ± 0.34	0.07 ± 0.37	.08
Filled	0.03 ± 0.33	0.08 ± 0.35	.09
dmft	1.74 ± 2.66	0.83 ± 2.80	<.001
Decayed*	1.35 ± 2.17	0.92 ± 2.17	<.001
Missing*	0.07 ± 0.42	0.08 ± 0.42	.32
Filled*	0.14 ± 0.60	0.16 ± 0.60	.14
DMFT*	1.56 ± 2.34	1.14 ± 2.34	<.001
Decayed	1.02 ± 1.67	1.16 ± 1.77	.003
Missing	0.11 ± 0.48	0.08 ± 0.48	.06
Filled	0.25 ± 0.78	0.23 ± 0.71	.002
DMFT	1.38 ± 1.96	1.46 ± 2.04	.68

Abbreviations: DMFT*, Decayed*, Missing* and Filled* Teeth Index, specifically applied to children aged between 7 and 12 (mixed dentition); dmft, decayed, missing and filled teeth index, specifically applied to children aged 5–6 years (primary dentition); DMFT, Decayed, Missing and Filled Teeth Index, specifically applied to children aged 13 years and older (permanent dentition); LM, living in monasteries; LSH, living in secular houses.

3.2.3 | Treatment needs

A total of 342 (37.3%) children needed a preventive or routine dental treatment (Code 1), 326 (35.6%) needed a prompt treatment (including scaling; Code 2), 152 (16.6%) needed an immediate (urgent) dental treatment due to pain or infection of dental and/or oral origin (Code 3), and finally, 96 (10.5%) needed no treatment (Code 0). A correlation between caries experience and treatment need, due to the origin of pain, is predominantly dental (Table 3).

3.2.4 | Administered treatment

The analysis of dental pre-existing administered treatment on 224 of 916 (24.5%) children showed that the most common treatment was scaling in 75 children (33.5%), followed by tooth extraction, in 66 children (29.5%); endodontic treatment, 44 children (19.6%); and dental fillings, 40 children (17.9%). An orthodontic treatment was found to be necessary for 14 (6.3%) children.

3.3 | Other oro-dental conditions

3.3.1 | Onychophagia

Onychophagia, the habit of habitually biting nails, has been recognized among children of the study population. The analysis has shown that 122 of 916 (13.3%) children suffered from onychophagia. Among LM children, 33 (15.4%) presented with onychophagia, whereas 181 (84.6%) did not. LSH children with onychophagy were 89 (12.7%), whereas most (613, 87.3%) were not affected.

3.3.2 | Dental erosion

The severity of dental erosion level for 901 (98.4%) children corresponded to 0, whereas for 11 (1.2%) children, it was 1; the remaining four children (0.4%) had a severity level of 2, and they were all females. Additionally, the average number of teeth affected by dental erosion corresponded to 0.02. Among LM children, the severity level for 211 (98.6%) children corresponded to 0, whereas 3 (1.4%) had a severity of 1; none of them had a level coinciding with 2. Among LSH children, the severity level for 690 (98.3%) children corresponded to 0, whereas eight

TABLE 3 Intervention urgency by the presence/absence of caries.

Intervention urgency[1]				
DMFT*	**0, *n* (%)**	**1, *n* (%)**	**2, *n* (%)**	**3, *n* (%)**
DMFT* > 0	8 (8.3)	184 (53.8)	308 (94.5)	149 (98.0)
DMFT* = 0	88 (91.7)	158 (46.2)	18 (5.5)	3 (2.0)
Total	96 (10.5)	342 (37.3)	326 (35.6)	152 (16.6)

Note: The modalities have been codified as follows: 0 = no treatment; 1 = preventive or routine treatment; 2 = rapid treatment; 3 = urgent treatment.

Abbreviations: DMFT*, Decayed*, Missing* and Filled* Teeth, as presence/absence of caries in the whole sample; LM, living in monasteries; LSH, living in secular houses.

[1]The modalities have been codified as follows: etc...

(1.1%) had a severity of 1, and four females with a level coinciding with two were all LSH.

3.3.3 | Dental trauma

The mean number of teeth affected by dental traumas was 0.04. Of the total sample, 872 (95.2%) children had a dental trauma status corresponding to 0. 20 (2.2%), while it coincided with 2 for 20 of them (2.2%), 6 for 16 of them (1.7%), 3 for 6 of them (0.7%), and it corresponds to 1 and 4 (0.1%) for 1 of them.

3.3.4 | Oral mucosal lesions

When evaluating oral mucosal lesions, both the condition and the anatomical location were documented. Among 875 children (95.5%), no pathological conditions were observed, whereas 41 children (4.5%) presented with various lesions. The location and type of oral mucosal conditions were carefully noted for all 69 evaluated clinical lesions. Of the 41 children with lesions, 26 (63.4%) LM children exhibited a total of 37 lesions likely associated clinically with Candida spp. infection and dietary deficiencies,[16] notably 19 (27.5%) lesions located on oral commissures and 18 (26.1%) on lips. Cheilitis is characterized by inflammation and cracking of lips, often associated with Candida spp. infection and nutritional deficiencies.[16,17] Geographical tongue was present in 17 cases (24.6%) among LM children, manifesting as irregular patches on the dorsal surface of the tongue, resembling a map-like appearance due to epithelial desquamation. Additionally, 15 children (36.6%), exclusively among LSH children presented with oral mucosal lesions, characterized by erosive aspect. A total of six (8.7%) erosive lesions presented on the alveolar ridges/gingiva associated with frictional keratosis, a benign, thickened, white patch of tissue caused by chronic frictional trauma. A total of three (4.3%) erosive lesions were localized on the hard and/or soft palate, four (5.8%) on the buccal mucosa and two (3%) on the sulci. The mucosal erosions observed in the sample refer to such lesions being of reactive/traumatic aetiology, characterized by areas of the oral mucous membrane where the superficial layers were lost or eroded due to a reactive factor in response to an external and traumatic stimulus such as those caused by physical injury or trauma.

4 | DISCUSSION

The Chinese occupation of Tibet in the 1950s led to Tibetan migration mainly to India, where they have now become an integral part of the population. The Tibetan ethnic minority in India, although understudied, holds great importance in understanding how religious and cultural influences affect the oral health of small ethnic groups.[13]

This study aimed to assess and compare the oral health of Tibetan children from local schools in Bylakuppe, Mysore district, India, specifically focusing on the LSH and LM groups.

In terms of oral hygiene habits, the study found that most children brushed their teeth once a day, with a smaller proportion brushing twice or three times daily, and these findings exactly align with previous research findings on Tibetan children living in India.[1]

With respect to OHI, both LM and LSH Tibetan children exhibited high rates (99.5% and 98.2% respectively), probably related to the Hawthorne effect, characterized by behavioural changes when individuals are aware of being observed.[18–21]

The prevalence of dental caries in the sampled population was 70.9%, indicating a substantial burden of dental caries among Tibetan children in Bylakuppe. This underscores the pressing need for effective preventive measures and oral health promotion programmes in this population. Interestingly, it was observed that LM children had lower caries levels than LSH children, with statistically significant differences only in the mean values of dmft for mixed and primary dentition (DMFT*; dmft). This difference could be attributed to various factors, such as dietary

habits (e.g., predominantly vegetarian diets with no intake of refined sugars) and oral hygiene practices between the two groups. The study did not investigate the specific reasons for this difference, but it suggests that religious, cultural and dietary practices within the monastic setting may contribute to improved oral health outcomes.

This study assessed the dental treatment needs of Tibetan schoolchildren in Bylakuppe and found that 152 (16.6%) required immediate (urgent) treatment due to pain or oral infections, Code 3 by WHO,[14] whereas the majority needed preventive or routine care, Code 1 by WHO[14] This underscores the high demand for dental care among Tibetan schoolchildren in Bylakuppe, with limited access to specific community dentistry and prevention programmes due to social and economic constraints.

Comparing the results of this study with previous research on dental caries among Tibetan children in Bylakuppe (Mysore district, India) reveals both similarities and differences. In terms of caries prevalence, the current study reported that 70.9% of Tibetan children had at least one carious lesion, similar to a previous study[1] that found a caries experience of 69% among Tibetan schoolchildren. Another study in Bylakuppe, however, discovered higher mean DMFT scores in 11- to 13-year-old Tibetan children than in non-Tibetan schoolchildren, indicating a greater caries burden among Tibetans in their study.[13] The average scores of DMFT and dmft in the current study were slightly higher for Tibetan children than those in studies on Tibetan children conducted in the same district.

In the present study, oro-dental lesions were examined, and most children (95.5%) were free from pathological conditions. A small percentage (4.5%) exhibited oral mucosal conditions, with candidiasis-associated lesions being the most common. These findings show that among the evaluated sample, only LM schoolchildren had oral lesions clinically associated with candidiasis, as opposed to LSH children. These lesions refer to pathological changes in the oral mucosa resulting from infection with Candida spp., commonly found on oral commissures, lips and tongue, and they could be indicative of the underlying immune system issues or dietary deficiencies (e.g., cheilitis and glossitis).

LM children, who follow a traditional monastic life, often have distinct dietary patterns from LSH children,[22–25] which may contribute to the development of involuntary nutritional deficiencies.[26–28]

According to a recent review, which analysed studies from various WHO geographic regions, it is evident that the distribution of oral conditions varies across different regions.[29] In terms of the pooled relative frequency of oral conditions by WHO region, the review identified several oral lesions consistently appearing in the top 10 across different regions, including oral ulcers, geographic tongue, oral infections and trauma-associated lesions.[29] Focusing specifically on Tibetan children sampled, the frequency candidiasis and oral ulcers observed in the sample aligns with the scoping review's findings of ulcers being among common oral lesions across multiple regions, specifically in South India.[30]

This cross-sectional study on the oral health of Tibetan children living in Bylakuppe, while lacking a longitudinal analysis, still offers valuable insights into their oral health status for tailored interventions and preventive (e.g., dental hygiene and healthy diet) programmes to address the high dental caries prevalence. While our study provides some valuable insights into oral health disparities within the specific cultural enclave of Bylakuppe, India, it is essential to acknowledge the limitation arising from the relatively small and focused group, a constraint largely dictated by logistical temporal considerations. Despite initial plans for a longitudinal study, the COVID-19 pandemic posed challenges that made it unfeasible, impacting data collection, follow-up assessments and research protocols as originally intended.

Future research should consider deeper studies and qualitative research on cultural and socio-economic factors affecting oral health practices among communities of Tibetan children.

AUTHOR CONTRIBUTIONS

G.C., B.N. and R.M conceived the ideas; G.C., Gio.C, N.M. and R.M. collected the data; G.C., F.B. and R.M analysed the data; G.C., F.B., B.N. and R.M led the writing, and drafted and reviewed the manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS APPROVAL

The study protocol conformed to the ethical guidelines of the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. To ensure adherence to ethical guidelines, we sought approval for the study and obtained necessary permissions from the Institutional Board of Tso Jhe Khangsar Hospital Charitable Institute under the Department of Health, Central Tibetan Administration.

PATIENT CONSENT

Consent was obtained from the principals of the respective schools where the study was conducted. Prior oral informed consent was also acquired from the parents of the participating children, who were also informed through public announcements. In the case of children attending residential schools (monasteries), consent was obtained from the head of the institution. Children whose parents/caregivers declined permission to participate were excluded from the study.

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REFERENCES

1. Havaldar K, Bhat S, Hegde S. Oral health status of Tibetan and local school children of Kushalnagar, Mysore district, India: a comparative study. *J Indian Soc Pedod Prev Dent*. 2014;32(2):125-129. doi:10.4103/0970-4388.130959
2. Bhatt S, Gaur A. Dental caries experience and utilization of oral health services among Tibetan refugee-background children in Paonta Sahib, Himachal Pradesh, India. *J Immigr Minor Health*. 2019;21(3):461-465. doi:10.1007/s10903-018-0769-7
3. Chhaliyil P, Fischer K, Schoel B, Chhalliyil P. Impact of refined and unrefined sugar and starch on the microbiota in dental biofilm. *J Int Soc Prev Community Dent*. 2022;12(5):554-563. doi:10.4103/jispcd.JISPCD_104_22
4. Ferrazzano GF, Cantile T, Sangianantoni G, et al. Oral health status and unmet restorative treatment needs (UTN) in disadvantaged migrant and not migrant children in Italy. *Eur J Paediatr Dent*. 2019;20(1):10-14. doi:10.23804/ejpd.2019.20.01.02
5. Khanapure S, Abraham A, Abokhlifa Y, Sam G, MSr R, Subhash N. Prevalence of dental caries and treatment needs in Tibetan monks and nuns in Karnataka. *J Pharm Bioallied Sci*. 2020;12(5):214-217. doi:10.4103/jpbs.JPBS_64_20
6. Mahajan P. Dental caries status and treatment needs among Tibetan refugees residing in Shimla, Himachal Pradesh, India. *Int J Migr Health Soc Care*. 2013;9(3):146-154. doi:10.1108/IJMHSC-07-2013-0023
7. Northridge ME, Kumar A, Kaur R. Disparities in access to oral health care. *Annu Rev Public Health*. 2020;41(1):513-535. doi:10.1146/annurev-publhealth-040119-094318
8. Peres MA, Macpherson LMD, Weyant RJ, et al. Oral diseases: a global public health challenge. *Lancet*. 2019;394(10194):249-260. doi:10.1016/S0140-6736(19)31146-8
9. Drummond BK, Meldrum AM, Boyd D. Influence of dental care on children's oral health and wellbeing. *Br Dent J*. 2013;214(11):E27. doi:10.1038/sj.bdj.2013.533
10. Prakash LTO. *Tibetan refugees in India: The case of Bylakuppe in Karnataka*. Vol. 11.
11. Tarodi T. *Revisiting Home: Tibetan Refugees, Perceptions of Home (Land) and Politics of Return*. Institute for Social and Economic Change; 2011.
12. Draft Global Oral Health Action Plan (2023–2030). Accessed February 16, 2024. https://www.who.int/publications/m/item/draft-global-oral-health-action-plan-(2023-2030)
13. Sivakumar V. Oral health status of Tibetan and local school children: a comparative study. *J Clin Diagn Res*. 2016;10:ZC29-ZC33. doi:10.7860/JCDR/2016/22853.8887
14. Petersen PE, Baez RJ, WHO. *Oral Health Surveys: Basic Methods*. 5th ed. World Health Organization; 2013.
15. Greene JG, Vermillion JR. The simplified oral hygiene index. *J Am Dent Assoc*. 1964;68(1):7-13. doi:10.14219/jada.archive.1964.0034
16. Taylor M, Brizuela M, Raja A. *Oral Candidiasis*. StatPearls Publishing; 2023. http://www.ncbi.nlm.nih.gov/pubmed/24598219
17. Paillaud E, Merlier I, Dupeyron C, Scherman E, Poupon J, Bories PN. Oral candidiasis and nutritional deficiencies in elderly hospitalised patients. *Br J Nutr*. 2004;92(5):861-867. doi:10.1079/BJN20041264
18. Parsons HM. Hawthorne: an early OBM experiment. *J Organ Behav Manage*. 1991;12(1):27-43. doi:10.1300/J075v12n01_03
19. Adair JG. The Hawthorne effect: a reconsideration of the methodological artifact. *J Appl Psychol*. 1984;69(2):334-345. doi:10.1037/0021-9010.69.2.334
20. Feil PH, Grauer JS, Gadbury-Amyot CC, Kula K, McCunniff MD. Intentional use of the Hawthorne effect to improve oral hygiene compliance in orthodontic patients. *J Dent Educ*. 2002;66(10):1129-1135.
21. Pizzo G, Matranga D, Maniscalco L, Buttacavoli F, Campus G, Giuliana G. Caries severity, decayed first permanent molars and associated factors in 6–7 years old schoolchildren living in Palermo (Southern Italy). *J Clin Med*. 2023;12(13):4343. doi:10.3390/jcm12134343
22. Rath EC. Mealtime at a Tibetan monastery. *Gastronomica*. 2010;10(2):17-21. doi:10.1525/gfc.2010.10.2.17
23. Latal R, Habanova M, Selinger E, Bihari M, Hamulka J. Cross sectional study of vitamin B12 supplementation in Slovak and Czech vegans. *Rocz Panstw Zakl Hig*. 2023;74(2):195–205. doi:10.32394/rpzh.2023.0259
24. Mace JL, McCulloch SP. Yoga, ahimsa and consuming animals: UK yoga teachers' beliefs about farmed animals and attitudes to plant-based diets. *Animals*. 2020;10(3):480. doi:10.3390/ani10030480
25. Plotnikoff GA, Dobberstein L, Raatz S. Nutritional assessment of the symptomatic patient on a plant-based diet: seven key questions. *Nutrients*. 2023;15(6):1387. doi:10.3390/nu15061387
26. Gaitán-Cepeda LA, Sánchez-Vargas LO, Pavia-Ruz N, Muñoz-Hernández R, Villegas-Ham J, Caballos-Salobreña A. Oral Candida in Mexican children with malnutrition, social marginalization, or HIV/AIDS. *Rev Panam Salud Publica*. 2012;31(1):48-53. doi:10.1590/S1020-49892012000100007
27. Zhou Y, Zhou ZQ, Liu XW, Zhang LM, Wang Y, Lin XP. Relationship between peripheral blood micronutrients and

four kinds of oral mucosal diseases in children: clinical analysis of 217 cases. *Shanghai Kou Qiang Yi Xue*. 2022;31(3):274-281.
28. Pinto-Almazán R, Frías-De-León MG, Fuentes-Venado CE, et al. Frequency of Candida spp. in the oral cavity of asymptomatic preschool Mexican children and its association with nutritional status. *Children*. 2022;9(10):1510. doi:10.3390/children9101510
29. Hong CHL, Dean DR, Hull K, et al. World workshop on oral medicine VII: relative frequency of oral mucosal lesions in children, a scoping review. *Oral Dis*. 2019;25(S1):193-203. doi:10.1111/odi.13112
30. Sholapurkar A, Vengal M, Mathew A, Pai K. The prevalence of oral mucosal lesions in patients visiting a dental school in southern India. *Indian J Dent Res*. 2008;19(2):99-103. doi:10.4103/0970-9290.40461

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