

# REASSESSING PROJECT APPROACH OF BOCAS SANAS HOLANDA-MAIMON (BSHM) AFTER COVID-19 PANDEMIC: WHAT IS EFFECTIVE AND EFFICIENT?

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**Abstract.** This field study was conducted to reassess the DMFT level among 11 to 13-year-old children in five schools in the Dominican Republic. It was also intended to report on the project approach and strategy, including the school-based Oral Health Education and Hygiene program of the Foundation Bocas Sanas Holanda-Maimón (BSHM).

In February, 20-23 and on March, 1, 2023, five primary schools in the province of Puerto Plata were visited, 'screened' and re-evaluated by a small BSHM-team of 3 professionals. Of 231 primary school children screened, the DMFT and PUFA levels of 65 11-13 year-old children were measured.

In eight years -compared to measured levels in 2015- the DMFT-level in 11 to 13 year-old children at two of the current selected 'BSHM-schools' has significantly increased to DMFT = 4.3 and DMFT = 7.9. In two schools the DMFT-level was both 3.8 and in one school the DMFT = 2.56. Also the PUFA-level were increased, i.e., more pulpal involvement, and fistulas. In general, more caries was seen; in 50%-96% of the screened school children. 104 children were referred to the clinic for professional (caries) treatment.

After COVID-19 pandemic, but also in comparison to the DMFT- and PUFA levels at the beginning of BSHM activities in 2008, the levels in the visited schools have increased and the oral health of school children has deteriorated significantly. Only one school measured healthy teeth and improved oral health.

Knowing that improving the implementation of evidence-based practice and public health depends on behavior change, and based on these results, it is only logical and realistic that a reconsidered approach to BSHM will have to be drawn up after more than 15 years. In any case, a serious adjustment at regional and local level; especially with regard to referrals to government agencies providing medical and dental care.

**Keywords:** Foundation Bocas Sanas Holanda-Maimón, School-based Oral Health Education and Hygiene program, Promotion of tooth brushing, Dominican Republic.

## Introduction

According to Buunk-Werkhoven and Reyerse (2020) - as well as based on their 35 years of experience as an oral hygienist- public health can be defined as promoting healthy lifestyles, preventing disease and organizing health services that often focus on improving the overall health of the community or individual, and usually it is a combined approach with prevention, including monitoring disease incidence and health indicators, combating infectious diseases and promoting healthy behavior. Studies on oral hygiene behavior change within (dental) public health show that conscious and well-meaning intentions to change habitual behaviors, such as tooth brushing, which is a complicated process, require a long-term approach (Buunk-Werkhoven et al. 2009, Buunk-Werkhoven et al. 2011<sup>a</sup>). In addition, understanding why behavior change is sometimes successful, but mostly not, is key to creating healthy behaviors and promoting health. Without insight into why it is that some oral health behavior change interventions are successful (Buunk-Werkhoven et al. 2012, Buunk-Werkhoven, Burrekers, 2019, Ghaffari et al. 2018) and others are less effective (Buunk-Werkhoven et al. 2021, Buunk-Werkhoven, Reyerse, 2020; Nawang Palupi Pratamawari et al. 2022), researchers and professionals are left with little evidence base (Davidson, Scholz, 2020).

Worldwide and increasingly, oral health problems are recognized as public health problems because of their prevalence, severity, impact on the individual and community, cost to the health system and the existence of effective prevention and treatment methods (GBD 2017 Oral Disorders Collaborators, Nalli et al. 2016). Early childhood and/or primary caries, and untreated dental caries are considered the most prevalent condition throughout the world (Adiatman et al. 2017, Peres et al. 2019). It can be seen that the established level of caries prevalence and need for dental treatment among vulnerable populations - usually measured by the decayed, missing and filled teeth index (DMFT) - is generally increasing in developing countries, but also among certain populations in developed countries (Buunk-Werkhoven et al. 2011<sup>b</sup>, Petersen, 2010, Seymour et al. 2020, Verlinden et al. 2019).

The present field study aimed to reassess -after the last state of affairs in 2015- the DMFT and PUFA level among 11 to 13-year-old children in five schools in the region of Maimón in the Dominican Republic. In addition, after 15 years from the start in 2008, this study aimed to evaluate the project approach and strategy

of the School-based Oral Health Education and Hygiene program, including the implementation of a new tooth brushing poster, of the Foundation Bocas Sanas Holanda-Maimón.

## Methods

### Research design and Ethics Statement

In accordance with the Declaration of Helsinki, authorization for participation in this study was obtained from the Foundation Bocas Sanas Holanda-Maimón (Greonterp, the Netherlands). Involvement of the primary schools was confirmed, participation of the schoolboys and girls was on a voluntary basis, they were informed about what participation entailed and were free to refuse contribution. Therefore, an extensive formal written informed consent of the parents/caregivers and of the schoolchildren was waived, and only verbal informed consent was obtained. Confidentiality was assured; no pressure was placed on all participants to take part in the screening by Dutch qualified dental hygienists, who conducted the screening using a natural routine method based on their own professional daily practice experience, without mutual calibration. The ethical board, the Central Committee on Research Involving Human Subjects, affirms that research that requires completing a questionnaire for one occasion does not fall under the scope of the Medical Research Involving Human Subjects Act (CCMO).

### Participants and procedure

In line with previous cross-sectional BSHM-studies, (Buunk-Werkhoven et al. 2011<sup>b</sup>), (Buunk-Werkhoven, Burrekers, 2019), and as a follow-up, at the end of February/beginning of March 2023, the DMFT and PUFA levels of 65 primary school children aged 11 to 13 years old, distributed among five selected schools, were measured around Puerto Plata, Dominican Republic by one Dutch dental hygienist, the second author with significant experience in qualifying these scores. In total, 231 children (65 surveyed group and 166 children aged 4 to 10 years), who went to the current selected schools within the prevention program of BSHM, were clinically examined and/or screened by a small BSHM-team, including the fourth author, who is the founder of Bocas Sanas, and who has been living in the Dominican Republic for most of the year since 2012. In the period when there is no volunteer group, the participating schools were visited by her, with or without one or two Dominican fellow-volunteers, to supervise and monitor the implementation of the BSHM-program.

The children of three out of five BSHM-schools, i.e. ‘Juana Hutardo-Loma de la Bestia’ (visited by tourists), ‘Los Canos’, and ‘Escuela Primera Andrés León Cervantes (Maggiolo)’ participated since 2008 in the prevention program of BSHM. These schools were also included in the previous study, and because the fourth school ‘Los Pasos de Sabiduria’ has been discontinued and has become a daycare center (Burrekers, et al, 2020), two schools, i.e., ‘Escuela Centro Educativo Los Rieles’ and ‘Escuela El Torro’ were added to reach a total of 65 children surveyed ranging in age from 11-12 and 13 years old. The school ‘Los Rieles’ was not involved in the BSHM project in 2015, however, some children, were in the control group and were clinically examined. Moreover, before the Corona pandemic, this school was just involved in the project and for the first time visited by the foundation Bocas Sanas in 2020. The other added school was ‘El Torro’; this school was selected, because the children –even after the COVID-19– continued to brush their teeth at the initiative of the school. So, not all school children included in this surveyed group were in the BSHM-project for more than three years. In 2020, three schools, i.e., ‘Escuela Primera Andrés León Cervantes (Maggiolo)’, ‘Escuela Centro Educativo Los Rielos’ and ‘Escuela El Torro’ were visit also by volunteers from the Bocas Sanas Holanda-Maimón foundation (Burrekers et al. 2020).

### Measures

The same DMFT and PUPA forms (Buunk-Werkhoven et al. 2011<sup>b</sup>), (Buunk-Werkhoven, Burrekers, 2019) were used to measure children individual’s clinical oral health status. The records of the DMFT indicated as: Decayed (D), Missing due to caries (M) or Filled (F; including Sealants) per element (T=Teeth), and the records of the PUFA indicated whether or not there was an exproation of the Pulp (P), Ulceration (U), Fistula (F) or Abscess (A). DMFT level was measured with a sum score of D, M and F. In a similar way the PUFA level was measured with a sum score of P, U, F and A. Frequency distributions of DMFT and PUFA levels were made, and averages were calculated of all quantitative variables; the calculation did not distinguish between milk and permanent teeth. If after screening or examination it was found that dental treatment was needed the children were referred to the government-run *Centro Sanitario* in Puerto Plata with dentists specialized in treatment for children or to the private clinic *CEPREDIMA* in Maimón, which collaborated with the BSHM foundation.

All five schools received oral health education, with an emphasis on regular tooth brushing; at least twice a day using a short horizontal scrub-tooth brushing method, which, according to Buunk-Werkhoven (2011<sup>a</sup>), can be considered a precursor to the Bass method. After all, with a refined motor skill development of children, the horizontal back and forth brushing motion is easily bent to a gentle massaging motion as used in the Bass method. Use of fluoride

toothpaste was promoted and brushing conform the ‘*inside, outside, upside, backside*’ brushing order, starting in the lower jaw and continuing the same ordering in the upper jaw. The Dutch BBBA - teeth brushing sequence (Buunk-Werkhoven et al. 2018), and known since 2020 as the Adentro, Afuera, Arriba, Atras - system (sistema AAAA; Burrekers et al. 2020) was lay-out and designed into a school poster by the third author (see Fig. 1).



**Fig. 1.** The Dutch BBBA-tooth brushing sequence (Buunk-Werkhoven et al. 2018), and in Spanish known as the Adentro, Afuera, Arriba, Atras - system (sistema AAAA; Burrekers et al. 2020).

## Results

### DMFT and PUFA levels

Table 1. shows the distribution of DMFT and PUFA variables for 65 children surveyed (age ranging from 11 to 13 years old) per school. The DMFT-level at two of the current selected ‘BSHM-schools’ has increased to DMFT = 4.3 and DMFT = 7.9. In two schools the DMFT-level was 3.8 and in one school the DMFT = 2.56. The PUFA-levels measured varied from 0.7 to 2.4. The two separate levels showed the degree of caries and fillings, and involvement of the pulp and fistula. Expert observation and professional experience showed that more caries were seen. On the face of it, significant differences between the schools were found for some variables, for instance, Missing due to caries (M); Juana Hutardo-Loma de la Bestia’: 6 out of 576 teeth versus Escuela Centro Educativo Los Rielos together with Escuela El Torro: none out of 559 in total. Exponation of the Pulp (P); Juana Hutardo-Loma de la Bestia’: 5 out of 576 teeth versus Escuela Centro Educativo Los Rielos: 7 out of 286. Fistula (F); Juana Hutardo-Loma de la Bestia’: 6 out of 576 teeth versus zero to one at the other 4 schools. In the same table (lower part) the frequencies of the included children’s clinical oral health status were presented.

**Table 1.** Distribution of the DMFT and PUFA variables per school/sample and the numbers of the included children's clinical oral health status.

	Juana Hutardo-Loma de la Bestia'*	'Los Canos'*	Escuela Primera Andrés León Cervantes (Maggiolo)*	Escuela Centro Educativo Los Rielos	Escuela El Torro
N sample	21	17	6	11	10
N teeth	576	428	157	286	273
N healthy	7	5	1	4	5
Mean DMFT	4.3	7.9	3.8	3.8	2.6
Mean PUFA	1.9	0.7	1.2	2.4	0.7
Decayed-T (N)	19	28	3	11	13
Missing	6	4	1	--	--
Filled (N)	--	2	2	--	1
Exponation of the Pulp (N)	5	2	1	7	1
Fistula (N)	6	1	--	--	--
Ulceration (N)	--	--	1	--	1
Gingivitis	7	4	1	4	3
Calculus	6	7	1	3	1
Pain/complaints	4	3	2	2	--
Toothbrushing at home	--	13	6 (2 only in the morning)	9 (2 not at home?)	10 (1 only in the morning)
>3 years at school	--	14	4	--	--
<3 years at school	--	3	2	11	--

\* These school were included in a previous effectiveness and evaluation study (Burrekers et al. 2020)

At two of the BSHM schools, i.e., the tourist-visited school “Juana Hutardo-Loma de la Bestia” and “Los Canos,” there were found to be more children with cavities and high DMFT scores, than at the two schools added to the BSHM project, i.e., Escuela Centro Educativo Los Rielos and Escuela El Torro, which were not visited by tourists.

### Screening of oral health status

Table 2 shows the distribution of all screened children's clinical oral health status per school visited. N = 154, including 65 children in the sample, age ranging from 4-13 years old. No screening of other children, not included in the sample, was done in Escuela Juan Hurtado/loma de la bestia and in Escuela El Torro, also 4 children of 4 to 5 years old were screened. At the other three schools the children, excluded of the sample, were between 7 to 10 years old. The vast majority (50%-96%) of the screened school children were struggling with dental problems, and for this reason 104 children were referred to the clinic for professional (caries) treatment.

**Table 2.** Distribution of all screened children’s clinical oral health status per school visited. N = 231

	Juana Hutardo-Loma de la Bestia’*	‘Los Canos’*	Escuela Primera Andrés León Cervantes (Maggiolo)*	Escuela Centro Educativo Los Rielos	Escuela El Torro
N sample	21	43	39	102	26
N healthy	7	6	22	9	11
Gingivitis	7	10	1	10	5
Calculus	6	10	2	8	5
Pain/complaints	4	11	3	6	2
Referral to Cepredima in Maimón	13	26	14	3	15
Referral to Centro Sanitario	--	--	1	32	1

\* These school were included in a previous effectiveness and evaluation study (Burrekers et al. 2020)

## Discussion

In 2023, DMFT and PUFA levels were reassessed to see if they changed among 11 to 13-year-old children in five schools. in the region of Maimón, in the Dominican Republic. This evaluation study was aimed, after the last state of affairs in 2015, i.e. after eight years, including the post-COVID-19 pandemic, to gain insight in the effects and benefits of the School-based Oral Health Education and Hygiene program of the Foundation Bocas Sanas Holanda-Maimón.

The DMFT-level at two of the included ‘BSHM-schools’ has increased to DMFT = 4.3 and DMFT = 7.9, and in two other schools the DMFT-level was 3.8. In July 2008, when the Foundation Bocas Sanas Holanda-Maimón promotion and prevention initiatives started, the DMFT level in the region of Maimón in the Dominican Republic was 3.9. According to Petersen (2003), the World Oral Health Report already showed that there was a moderate DMFT level of 2.7 to 4.4 in the Dominican Republic. Therefore, continued attention and behavioral interventions for oral health were and are needed to lower the DMFT level.

In comparison to a mean DMFT level of 3.6 found in 12-year-old children in a previous evaluation (Buunk-Werkhoven, Burrekers, 2015) the current DMFT outcomes mismatched one of the main goals of the World Health Organization (WHO), to reduce the DMFT of 12-year-old children to less than 3.0. Only in the new added school ‘El Torro’ the DMFT level of 2.56 matches this main goal. An explanation for this low DMFT score phenomenon could be that these school children –even after the corona pandemic– continued to brush their teeth at the initiative of the school. Moreover, knowing that optimal tooth brushing is a complicated process for the children in particular (Leghrouz et al, 2024), BSHM focused on awareness and behavioral change in tooth brushing among primary school children, by emphasizing in their intervention on the ‘inside, outside, upside, backside’ tooth brushing sequence, starting in the lower jaw and continuing the same ordering in the upper jaw (Buunk-Werkhoven et al. 2018); the Spanish Adentro, Afuera, Arriba, Atras – system (sistema AAAA; Burrekers et al, 2020). This method of teaching teeth brushing and the learning method through repetition may have led to an improvement in oral hygiene among children at this school.

The current PUFA levels varied from 0.7 to 2.4 which were also higher than the measured mean PUFA level of 0.32 (0.03 in the intervention group versus .058 in control group) in the 2015 study (Buunk-Werkhoven, Burrekers, 2019). Given these results, the question is to what extent the COVID-19 pandemic influenced previous BSHM findings. In particular, the inventoried data are important clues for aligning an adapted or renewed approach and strategy of BSHM interventions. Together with descriptive findings from participation in the semi-structured interviews about ‘Oral health care in rural Dominican Republic: the work of Bocas Sanas’ by Doorman and Doorman-Vasquez (DentalInfo Dutch newsletter, 2024), the evaluations provide insight into the effectiveness and efficiency of the BSHM program and showed that over the years there is a high reliance among BSHM schools to keep toothbrushing program going. Only a few schools were able or took the initiative to continue the program after the corona pandemic. Maintenance and repair of toothbrushing facilities is problematic: many break down, small repairs are often not done by the school, and like the availability of fluoride toothpaste and brushes, there is a tendency to wait for BSHM foundation to solve the problems.

This third evaluation study has some limitations. First, like reported in the previous cross-sectional studies (Buunk-Werkhoven, Burrekers, 2019), the sample size used in this study was based on the number of children screened at the BSHM-schools. Second, although in this study only one dental hygienist did the screening of the research sample (N=65), still using DMFT and PUFA measures for the oral condition are valuable and sufficient for status of the oral health of a target population (Benzian, 2017). Third, only three 'BSHM schools' which participated for longer than three years in the BSHM program were included in this evaluation.

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However, the present findings provide actual insight into the oral health condition of 11-13 year-old children in the region of Maimón, in the Dominican Republic. Noteworthy, school-based oral health education program, e.g., toothbrushing stands or falls with an involved schoolboard or board members who provide teachers the possibility to organize and facilitate school toothbrushing. Mostly, the problem is that if involved people disappear, for example by transferring to another school, the program will still collapse. An optimal and only option to prevent the latter is to ensure that the Ministry of Education takes over the program (Ruff et al. 2023).

Ultimately and in the long term, referral of mothers and their babies or toddlers by well-child care (WCC) for their first preventive dental visit appears to lead to an earlier start of promoting oral health (behavior) and initiation of oral/dental care (Verlinden et al. 2024). After screening in this field study, 70 children have been referred to the clinic in Maimon where a BSHM related local dentist and the fourth author voluntarily treat the referred children from the Bocas Sanas schools every week. Also, 34 children have been referred to the government institution Centro Sanitario in the city of Puerto Plata, where they can be treated for a small fee. In the province of Puerto Plata, many people have little or no access to adequate health care, and even less access to dental care and prevention. So, it still appears that for certain target groups (Buunk-Werkhoven, Burrekers, 2017) an active referral does not always lead to a greater effect than a passive or indirect referral (Buunk-Werkhoven et al. 2021).

However, there was a surprising twist in the negative consequences of tourist visits to schools. The Juan Hurtado School in Loma de la Bestia is known to be frequently visited by tourists. This was also the case in February 2023 and coincidentally during a visit by the Bocas Sanas team. After an explanatory conversation about the negative effects of giving sweets to the schoolchildren, this particular group of tourists then made a joint donation, for which a double sink -for washing dishes- was purchased and installed. Ultimately, the toothbrush installation could exclusively be used for what it was intended for: tooth brushing!

## **Conclusions**

Interventions and policies, such as the School-based Oral Health Education and Hygiene program of BSHM, to change tooth brushing behavior and improve oral health, should systematically reveal the essential results of the research, and empirical research should emphasize the activities performed. Support from local and regional institutions, government, and research is needed to determine the extent to which the Foundation Bocas Sanas Holanda-Maimón (BSHM) activities can lead to a more efficient approach and effective interventions.

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## References

1. Adiatman, M., Zhafarina, A.R., Rahardjo, A., Badruddin, I.A., & Prabawanti, C. (2017) The Correlation between Mother's Behaviors of Maintaining Their Children's Oral Hygiene and Early Childhood Caries (Based on the Theory of Planned Behavior). *Journal of International Dental and Medical Research* 10 (Special Issue), 619-627.
2. Benzian, H., Garg, R., Monse, B., Stauf, N., & Varenne, B. Promoting Oral Health through Programs in Middle Childhood and Adolescence. In: Bundy, D.A.P., Silva, Nd., Horton, S., Jamison, D.T., Patton, G.C., editors. *Child and Adolescent Health and Development*. 3rd edition. Washington (DC): The International Bank for Reconstruction and Development / The World Bank; 2017 Nov. Chapter 16.
3. Burrekers, S.Y., Doorman-Vasquez, M.C., Faes-Siebgens, M.J.C.M., Pascual, R.A., & Buunk-Werkhoven, Y.A.B. (2020). Self-Perceived Behavior and Process Evaluation of Bocas Sanas Holanda-Maimón (BSHM): From the Past to the Future. *Biomedical Journal of Scientific & Technical Research*, 26(5), BJSTR. MS.ID.004422.
4. Buunk-Werkhoven, Y.A.B. & Burrekers, S.Y. (2019). Effects and Benefits of a Program to Promote Tooth Brushing Among 12-Year-Old School Children in the Dominican Republic. *Advances in Dentistry & Oral Health*, 10(5), 555799. DOI: 10.19080/ADOH.2019.10.555799.
5. Buunk-Werkhoven, Y.A.B., & Burrekers, S.Y. (2017) Oral health awareness, promotion of home oral self-care, and professional oral health care among young mothers and their babies: a pilot project. *Oral Health and Care*, 2(5), 1-4
6. Buunk-Werkhoven, Y.A.B., Burrekers, S.Y., Jongboer, A., Quant, D.F., & van Maanen-Schakel, N, W. (2011<sup>b</sup>). Determinants of oral hygiene behavior in the Dominican Republic. *International Dental Journal*, 61, 328-333.
7. Buunk-Werkhoven, Y., Dijkstra-le Clercq, M., Verheggen-Udding, E., de Jong, N., & Spreen, M. (2012). Halitosis and oral health-related quality of life: a case report. *International journal of dental hygiene*, 10(1), 3–8. <https://doi.org/10.1111/j.1601-5037.2011.00512.x>
8. Buunk-Werkhoven, Y.A.B., Dijkstra, A., & van der Schans, C.P. (2011<sup>a</sup>). Determinants of oral hygiene behavior: A study based on the theory of planned behavior. *Community Dentistry and Oral Epidemiology*, 3, 250-259.
9. Buunk-Werkhoven, Y. A.B., Dijkstra, A., van der Wal, H., Basic, N., Loomans, S. A., van der Schans, C. P., & van der Meer, R. (2009). Promoting oral hygiene behavior in recruits in the Dutch Army. *Military Medicine*, 174(9), 971–976. <https://doi.org/10.7205/milmed-d-05-0408>
10. Buunk-Werkhoven, Y.A.B., Gortzak, J.J.C., Sjoerts, J.E., & Frederiks, A. (2021). 'Outspoken' Oral Hygienists Promote Oral Health Care Awareness at Public Events for (Pregnant) Women and Young Mothers. *Journal of Dental Hygiene Science*, 21, 140-9. <https://doi.org/10.17135/jdhs.2021.21.3.10>
11. Buunk-Werkhoven, Y.A.B., & Reyerse, E. (2020). What is the impact of oral (public) health promotion, and of interventions for oral (self) care awareness raising and behavior change? *Journal of Dentistry, Oral Disorders & Therapy*, 8, 1-4.
12. Buunk-Werkhoven, Y.A.B., Takrovskaja, K., & Steverink-Jorna, L.M. (2018). Kidsfabriek, Oral health awareness and promotion of oral self-care during a learning and play event for children and parents in The Netherlands. *Annual Clinical Journal of Dental Health*, 7, 22-25.
13. Davidson, K.W., & Scholz, U. (2020). Understanding and predicting health behaviour change: a contemporary view through the lenses of meta-reviews. *Health Psychology Review*, 14(1),1-5. doi:10.1080/17437199.2020.1719368
14. GBD 2017 Oral Disorders Collaborators, Bernabe, E., Marcenes, W., Hernandez, C. R., Bailey, J., Abreu, L. G., Alipour, V., Amini, S., Arabloo, J., Arefi, Z., Arora, A., Ayanore, M. A., Bärnighausen, T. W., Bijani, A., Cho, D. Y., Chu, D. T., Crowe, C. S., Demoz, G. T., Demsie, D. G., Dibaji Forooshani, Z. S., ... Kassebaum, N. J. (2020). Global, Regional, and National Levels and Trends in Burden of Oral Conditions from 1990 to 2017: A Systematic Analysis for the Global Burden of Disease 2017 Study. *Journal of Dental Research*, 99(4), 362–373. <https://doi.org/10.1177/0022034520908533>
15. Ghaffari, M., Rakhshanderou, S., Ramezankhani, A., Buunk-Werkhoven, Y., Noroozi, M., & Armoon, B. (2018). Are educating and promoting interventions effective in oral health? A systematic review. *International Journal of Dental Hygiene*, 16(1), 48–58. <https://doi.org/10.1111/idh.12305>
16. Leghrouz, L., Khole, M.R., Splieth, C.H., & Schmoeckel, J. (2024). Tooth Brushing Learning Methods: Differential or Conventional? A Randomized Controlled Clinical Trial. *Caries research*, 10.1159/000538226. Advance online publication.
17. Nalli, S., Bindiganavale, S.R., & Chowdary, B.U.K. (2016). A study of oral health promotion activities in India. *International Journal of Community Medicine and Public Health*, 3(8), 2270-2274.
18. Nawang Palupi Pratamawari, D., Ansya Balgies, G., Buunk-Werkhoven, Y.A.B. (2022). How Effective Is Toothbrush Education through Environmental Changes in Elementary School Children. *Journal of Dental Hygiene Science*, 22, 30-6. <https://doi.org/10.17135/jdhs.2022.22.1.30>
19. Peres, M. A., Macpherson, L. M. D., Weyant, R. J., Daly, B., Venturelli, R., Mathur, M. R., Listl, S., Celeste, R. K., Guarnizo-Herreño, C. C., Kearns, C., Benzian, H., Allison, P., & Watt, R. G. (2019). Oral diseases: a global public health challenge. *Lancet (London, England)*, 394(10194), 249–260. [https://doi.org/10.1016/S0140-6736\(19\)31146-8](https://doi.org/10.1016/S0140-6736(19)31146-8)
20. Petersen, P. E. (2010). Improvement of global oral health--the leadership role of the World Health Organization. *Community Dental Health*, 27(4), 194–198.

21. Petersen P. E. (2003). The World Oral Health Report 2003: continuous improvement of oral health in the 21st century- the approach of the WHO Global Oral Health Programme. *Community dentistry and oral epidemiology*, 31 Suppl 1, 3–23. <https://doi.org/10.1046/j.2003.com122.x>
22. Ruff, R. R., Monse, B., Duijster, D., Itchon, G. S., Naliponguit, E., & Benzian, H. (2023). Effectiveness of school-based strategies to prevent tooth decay in Filipino children: A cluster-randomized trial. *Community Dentistry and Oral Epidemiology*, 51(2), 219–227. <https://doi.org/10.1111/cdoe.12729>
23. Seymour, B., James, Z., Shroff Karhade, D., Barrow, J., Pruneddu, A., Anderson, N. K., Mossey, P., & Definition of Global Health, T. F. F. T. (2020). A definition of global oral health: An expert consensus approach by the Consortium of Universities for Global Health's Global Oral Health Interest Group. *Global Health Action*, 13(1), 1814001. <https://doi.org/10.1080/16549716.2020.1814001>
24. Verlinden, D. A., Reijneveld, S. A., Lanting, C. I., van Wouwe, J. P., & Schuller, A. A. (2019). Socio-economic inequality in oral health in childhood to young adulthood, despite full dental coverage. *European Journal of Oral Sciences*, 127(3), 248–253. <https://doi.org/10.1111/eos.12609>
25. Verlinden, D. A., Schuller, A. A., Vermaire, J. H. E., & Reijneveld, S. A. (2024). Referral from well-child care clinics to dental clinics leads to earlier initiation of preventive dental visits: A quasi-experimental study. *International Journal of Paediatric Dentistry*, 34(2), 190–197. <https://doi.org/10.1111/ipd.13124>

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