

Public health perspective of untreated dental caries among 5–7-year-old school children in rural Sri Lanka – A cross-sectional survey

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Abstract: Untreated dental caries and its clinical consequences has become a public health problem notably polarized to socio-economically deprived children in many countries thus demonstrating social inequality. However, severity of untreated dental caries according to clinical consequences was rarely reported in literature in the past, until development of PUFA/pufa index by Mons et al., 2010. The dmft/DMFT indices of basic methods of World Health Organization (WHO) have become the choice for all national oral health surveys and epidemiological surveys conducted across the globe. Nevertheless, those indices of caries status provide limited information about the severity of advanced carious lesions.

A cross sectional study was conducted among Grade 1 school children in a rural MOH area of Sri Lanka and sample comprised of 198 girls and 203 boys. Dental caries was measured according to WHO criteria and clinical consequences of untreated dental caries were measured using pufa/PUFA indices. The prevalence of untreated dental caries among 5–7-year-old school children was 54.6% with a mean dmft of 3.2 ± 3.27 and pufa prevalence was 34.2% with a mean pufa of 1.05 ± 1.45 . Untreated caries pufa ratio was 41% among these children as 41% untreated teeth had progressed to odontogenic infections. Both the prevalence and the severity of untreated dental caries and their clinical consequences among Grade 1 school children of this rural poverty stricken MOH area was high, reflecting more severe forms of untreated dental caries.

Key words: Clinical consequences of dental caries, Grade 1 school children, pufa, Severity, untreated dental caries

Introduction:

Dental caries denotes the most common chronic childhood disease and a major public health problem globally, despite improvements of oral health status of people over past few decades (FDI World Dental Federation, 2014; Oziegebe & Esan, 2013). As substantiated by research evidence and established scientific knowledge, dental caries is an easily preventable disease and most of the consequences of it could be prevented and controlled by introducing simple preventive measures or by providing simple restorations at early stages (Anil & Anand, 2017). Without appropriate timely treatment, dental caries in primary and permanent teeth could compromise child's ability of eating, sleeping as well as good functioning at school and home (Casamassimo et al., 2009).

According to current studies, the global prevalence of untreated dental caries of all ages is 40% (FDI World Dental Federation, 2015). Untreated dental caries in permanent teeth was the most prevalent disease among 291 diseases in the study of global burden of diseases which was conducted between 1999-2010 (Marcenes et al., 2013). Furthermore, untreated caries in deciduous teeth was the 10th most prevalent disease condition affecting 621 million children worldwide (Kassebaum et al., 2015). It is reported that about 7 in 10 children in India and 1 in 3 teenagers in Tanzania are affected by oral pain caused by untreated dental decay. The burden of untreated dental decay is most frequent in middle income countries and about 2/3 of them have not received appropriate treatment. Low-income countries are having lower level of dental decay but almost all remains untreated. Even high-income countries have about 50% untreated dental decay (FDI World Dental Federation, 2015). There is a large disparity of distribution of dental caries between different populations as the burden is disproportionately concentrated among the poor (Perera & Ekanayake, 2008).

According to the National Oral Health Survey of Sri Lanka 2015-2016, the proportion of untreated dental caries dominated the overall caries experience among all age groups (Ministry of Health, 2018). Especially among 5-year-old children, 63.1% had decayed, missing,

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and filled teeth and 60.7% of them had untreated dental caries in their deciduous dentition. Moreover, 1.5% had untreated dental caries of their permanent teeth. According to School Health Programme of Sri Lanka the number one morbidity among school children is the dental caries (*Annual Report on Family Health Bureau 2016 Family Health Bureau Ministry of Health Sri Lanka, 2016*).

High prevalence of untreated dental caries not only reflects the burden of dental caries but also severity of oral health care neglect. Studies have shown that treatment for dental caries is limited for young children especially in low- and middle-income countries (Pitts et al., 2005). However, untreated dental caries affects children's growth, general health, educational achievements and thus the quality of life of millions of children (Filstrup et al., 2003; Sheiham & Watt, 2000). The unaesthetic nature of the disease may affect a child's self-esteem and the social development. Therefore, failure to identify and provide care adequately at early stages of dental caries in children can be resulted in expensive and more serious long-term consequences. It will be a burden which makes poor people poorer. In UK number one reason for hospitalization of children is the consequences of untreated dental caries (Levine, 2021). The most common reason for hospitalization of children in British Columbia and Canada is the burden of untreated dental caries (Filstrup et al., 2003).

One of the best measures of severity of untreated dental caries is measuring clinical consequences including pulpal involvement, inflammation of surrounding oral mucosa, formation of fistula in relation to the untreated tooth due to chronic infection and a dental abscess. However, severity of untreated dental caries according to clinical consequences was rarely reported in literature in the past until development of PUFA/pufa index (pulp exposed, ulceration of oral mucosa, fistula, abscess in relation to untreated teeth) by Mons et al., 2010. The conventional DMFT index (Decayed, Missing, Filled Teeth) introduced by WHO for data collection of national oral health surveys which is commonly being used for epidemiological surveys provided limited information about the severity of advanced carious lesions (Mehta & Bhalla, 2014).

There are no published studies on clinical consequences in Sri Lankan context, especially in rural and poverty-stricken geographical areas. This is the first study conducted in Sri Lanka to explore the severity of untreated dental caries according to clinical consequences and it was measured using "pufa" index.

Methodology:

A descriptive cross-sectional study was conducted to assess the Prevalence and Severity of untreated dental caries among 5-7 years school children in Wellawaya Medical Officer of Health (MOH) area of the Monaragala district of Sri Lanka. Monaragala is one of the most poverty-stricken districts among all 25 districts of Sri Lanka. About 97.7% of population of Monaragala district is categorized as rural and 2.3% belongs to estate sector (*Central Bank of Sri Lanka, 2015*).

Monaragala district consists of a population of 451058 and the population of Wellawaya MOH area was 6880. There are 32 government schools with grade 1 classes in Wellawaya MOH area and 1279 grade 1 school children were there during the study period. This study was conducted within the period of 10th August to 31st December, 2016. All the Grade 1 school children attending government schools within Wellawaya MOH area were included to the study. Students who were absent on the days of data collection and only three Students who did not allow to, perform intra oral examination were excluded from the study.

Children were recruited for the study using a cluster sampling technique combined with probability proportionate to size. Self-administered, structured questionnaire was used to collect information about socio demographic data of the children. A modified version of DMFT index (WHO basic method of recording dental caries) was used to record dental caries of children. Pufa/PUFA index was used to record the severity of untreated dental caries. All the teeth were examined for pufa/PUFA and 1 score was given for each tooth with pufa/PUFA. PUFA stands for permanent dentition and pufa stands for deciduous dentition. Untreated dental caries Pufa/PUFA ratio was calculated by $\text{pufa} \times 100 / \text{d} + \text{D}$ d = decayed deciduous teeth, D = decayed permanent teeth. Principal Investigator was trained to record dmft score and to identify clinical consequences of untreated dental caries according to pufa index under the supervision of a Consultant in Restorative Dentistry and standardization of the clinical examination procedure was done to minimize intra examiner variability. Similar studies found in literature were referred to further clarify the data recording methods.

All the children were examined by the principal investigator. Data recording was done by a School Dental Therapist who received a training. Children were examined before the mid-day meal as far as possible. Others were asked to brush their teeth before examination. Children were examined using dental mirrors with a spot light in a class room or at the school dental. A portable dental chair was used for oral examination of children in sitting position. Since the Investigator was the only examiner, intra examiner variability was considered and to check repeatability, 3 children were re-examined at the end of each day.

Since dental caries recorded in permanent dentition was negligible all the calculations were done exclusively for the primary dentition. Prevalence of untreated dental caries was described as the percentage of children having at least one active carious lesion. Mean dmft and Standard Deviation (SD) was calculated for the population and the percentage (%) of d component of dmft was calculated. Median

dmft score and the interquartile range were calculated for the study population since distribution of dental caries was a skewed distribution. Pufa prevalence, mean pufa score, and the untreated teeth pufa ratio were calculated as indicators of the severity of untreated dental caries according to clinical consequences. Prevalence of pufa was considered as the percentage of children with 1 or more pufa score. Percentage of pulpal involvement (p %), percentage of ulceration of mucosa due to pulp exposed grossly carious tooth fragment (u %), percentage of fistula (sinus tract) in relation to pulp exposed tooth (f %), percentage of abscess in relation to carious tooth (a %) from the whole pufa score. Untreated teeth pufa ratio for the population was calculated as “pufa+PUFA/D+d x 100.” (D= number of decayed permanent teeth, d=number of decayed deciduous teeth.) Mean pufa and SD for the study population and contribution of different component of pufa index was also calculated.

Ethical clearance for the study was obtained from Ethical Review Committee of faculty of Medicine, University of Colombo. Voluntary participation was allowed administrative requirements Permission was obtained from zonal education director of Wellawaya, school principals of relevant schools, RDHS Monaragala, and MOH Wellawaya. Dates of data collection were pre informed to school principals.

Untreated dental caries was considered as Active carious lesions in any tooth surfaces, both extended to pulp or not extended to pulp, which has not filled appropriately. The percentage of children with at least one untreated tooth was considered as the prevalence of untreated dental caries. Pufa ratio: average of the percentage of untreated teeth which has extended into pulp or more in the population.

Pufa ratio = Pufa+PUFA/D+d x 100 D= number of untreated permanent teeth. d= number of untreated primary teeth. Pufa = pufa score (Number of teeth with pulpal symptoms.)

Results :

Distribution of study sample by age, sex is shown in the table 1.1 below. A total of 401 children were included in the study sample and the response rate was 93.9%. Moreover, 50.9% of the sample comprised of males. The ages of children ranged from 05 to 07 years with a Mean age of 5.9 years.

Table 1.1 characteristics of the study sample

Characteristic	Number of children	% Of children
Age Group		
5 years	138	34.4%
6 years	129	32.2%
7 years	134	33.4%
Total	401	100%
Gender		
Male	203	50.6%
Female	198	49.4%
Total	401	100%

There was a 54.6% prevalence of untreated dental caries among children and a higher untreated dental caries prevalence among males (65.5%) compared to females (43.4%) (Table 1.2)

Table 1.2 prevalence of untreated dental caries

Variable	Untreated dental caries			
	Present Number	percentage	Absent Number	Percentage
Male	133	65.5%	70	34.5%
Female	86	43.4%	112	56.6%
Total	219	54.6%	182	45.4%

Mean dmft for the study population was 3.2±3.27. The “d” component of dmft was 2.56±2.92 and it was 80% of dmft. Median dmft was 2 and median number of untreated teeth was 2. Males showed a higher dmft (3.56±3.36) than females (2.84±3.14) (Table 1.3).

Table 1.3 Average dmft score, the mean number, % of d component of dmft, median dmft and median untreated teeth of the study sample

number of

Variable	Mean dmft ±SD*	Mean number of untreated teeth SD*	Percentage of untreated component	Median dmft (IQR)**	Median Number of untreated teeth(IQR)**
Male	3.56 ± 3.36	2.83 ± 3.12	79.5%	3 (1-6)	2 (0-4)
Female	2.84 ± 3.14	2.27 ± 2.68	79.9%	2 (0-4)	2 (0-4)
Total	3.2 ± 3.27	2.56 ± 2.92	80.0%	2 (0-5)	2 (0-4)

Severity of untreated dental caries was measured according to pufa index. Mean pufa score for the study population was 1.05±1.46 and the median value of pufa score for the study sample was zero. The “pufa prevalence” was considered as the percentage of children with pufa score 01 or more and for the study sample untreated dental caries pufa prevalence was 34.2%. (Table 1.4)

Table 1.4 pufa prevalence of study sample:

Variable	Number & percentage of children with pufa score ≥1	Mean pufa score ±1	Median (IQR)
Male	68(33.5%)	1.06±1.56	1(0-2)
Female	69(34.8%)	1.04±1.35	1(0-2)
Total	137(34.2%)	1.05± 1.4	0(0-2)

Contribution of different component to the pufa index was demonstrated in table 1.5. P component of the pufa index was dominating the pufa score and mean p was 0.67.

Table 1.5 Composition of mean pufa by different component for the study sample.

Component of pufa	Mean (SD)	Medial (IQR)
p	0.67±1.09	9(0-1)
u	0.19±0.52	0(0-0)
f	0.13±0.42	0(0-0)
a	0.06±0.26	0(0-0)
pufa	1.05±1.46	0(0-2)

Proportion of children with different pulpal symptoms is shown in table 1.6 below. Pufa prevalence was 34.2% for the study population. Most common form of pufa was p and it was 25.9% (Presence of teeth with a pulp exposed cavity or with the broken crown part was coded as “p”).

Table 1.6 percentage of children with different signs of pulpal involvement of untreated dental caries.

Pulpal signs	Present Number (%)	Absent Number (%)
P	104 (25.9%)	297(74.1%)
u	37 (9.2%)	364(91.0%)
f	28 (7.0%)	373(93.5%)
a	14 (3.5%)	387(96.5%)
pufa	137 (34.2%)	264(65.8%)

Untreated dental caries pufa ratio:

Untreated dental caries pufa ratio was calculated for the study sample as a measure of severity of untreated dental caries & it was 41%.

Pufa ratio = $\frac{\text{average number of teeth with pufa score 1 or more (mean pufa)} \times 100}{\text{Average number of untreated teeth (Mean d)}}$

Average number of untreated teeth (Mean d).

Mean pufa = 1.05 , Mean d = 2.56

pufa ratio = $1.05/2.56 \times 100 = 41\%$

pufa ratio = 41%

Discussion:

Present study was undertaken to explore the burden of untreated dental caries, and its clinical consequences among 5–7-year-old Grade 1 school children in Wellawaya MOH area of the Monaragala district: a rural poverty-stricken district in Sri Lanka. It is noteworthy to mention that due to the negligible proportion of untreated dental caries in permanent teeth, analysis exclusively limited to the primary teeth among 5-7 year –old Grade 1 school children.

Dental caries has polarized into socio economically deprived communities therefore, it was considered this rural MOH area as a more suitable setting to study about the prevalence and the severity of untreated dental caries. The Grade 1 school children were selected for the study, since this group of children having maximum caries experience in deciduous dentition and feasible to access as they are in schools. According to WHO recommendations ideally five-year-old children are selected to national oral health surveys. However, with the scope of this study all the children in Grade 1, between 5- 7-year-old were selected. The pufa index was used to measure the severity of untreated dental caries according to clinical consequences, since it was designed to use in oral health surveys especially in low- and middle-income countries, to evaluate the unmet treatment need of dental caries.

Present study revealed 54.6% prevalence of untreated dental caries among 5–7-year-old Grade 1 school children (Table 4.5). Mean dmft was 3.2 ± 3.27 and the d component was 2.56 ± 2.92 (80% of dmft) for the 5–7-year-old Grade 1 school children (Table 4.6). However, National oral health survey of Sri Lanka 2015/2016 has reported that mean dmft of 5-year-old children as 3 ± 3.5 and mean d component as 2.7 ± 3.4 which is a 96.2% of dmft score. Moreover, it has revealed that prevalence of active dental caries among same age group as 60.7% (Ministry of Health Nutrition and Indigenous Medicine, 2018). Mean dmft of both study groups is consistent though, there is a notable difference in d components among two groups. Probably this may be due the school dental services which is well-established and functioning in the region. The target group of National Oral health Survey, 5-year-old children probably might not start schooling and they may have more untreated caries compare to school children. In Sri Lanka the target group of school dental services was Grade 1, Grade 4 and Grade 7 children until recent past. Even at present school dental service has not re-oriented to cater all the pre-school children, resulting more severe forms of consequences of untreated dental caries among Grade 1 school children.

Specially, the eye-opening fact that is explored by present study is the importance of in-cooperation of pufa index to measure the severity of untreated dental caries in order to uncover the oral health status of children, accurately. Otherwise, the conventional dmft index gives an impression that oral health status of both study group as more or less similar. However, present study reports 34.2% of children in study group are having clinical consequences of untreated dental caries with a mean pufa of 1.05 ± 1.46 (Table 4.7). Moreover, 41% of untreated dental caries among these children have become odontogenic infections.

However, the Sri Lanka NOHS 2002/2003 reported the prevalence of untreated caries, and mean dmft among 5- year- old children of the Sri Lanka as 63.51% and 3.51 respectively. Further the mean d component was 3.369 (92% of dmft). Unfortunately, NOHS2015/2016 has revealed that dmft of the same age group as 3 which might suggest a little improvement of oral health status after 12 years. However, the d component or the untreated caries component is 96.2% of dmft which is suggestive of a reverse in oral health status of 5-year-old children. It would have given the clearer picture about the oral health status of these children if severity of untreated dental caries has been measured with pufa index.

The comparison of oral health status of the children in present study group and two consecutive NOHSs are demonstrating table 1.6 below.

Comparison of mean dmft values shows a more or less similarity in dental caries status of these children over the years. However, this shows stagnating untreated dental caries among 5-year-old children in Sri Lanka over a period of 12 years. Marked reduction in the prevalence of untreated dental caries in present study could be attributed to the provision of school dental services for them. However, by that time 34.2% children had clinical consequences of untreated dental caries. If they were catered by school dental services at early pre-school age, it could have been possible to avoid clinical consequences of untreated dental caries among these children.

Table 1.7 Comparison of study findings of Sri Lanka on dental caries

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Study	Study period	Study group	Mean Dmft (SD)	Prevalence of untreated dental caries (d)	Ratio of %dmft/% d	Pufa prevalence
NOHS	2002-2003	5-year-old children	3.51	63.51%	92%	-
NOHS	2015-2016	5-year-old children	3 (3.5)	60.7%	96.2%	-
Present study	2016	5–7-year-old children	3.2(3.27)	54.6%	80%	34.2

Present study finding was comparable with the findings of the study conducted among 6-year-old primary school children in Denuwara educational zone: a semi – urban area of the Kandy district (Herath et al., 2011). This study demonstrated mean dmft as 3.5 (± 0.36), and the “d” component of dmft index was 76.26%. However, a possible reason for the existing little high contribution (80%) (table 4.6) of the d component to the mean dmft in present study compare to this study could be due to the lower utilization of oral health care services which may be associated with low socio-economic status of present study setting.

Moreover, a similar study was conducted in Karad city India, in 2014 among 3–5-year-old children. This study demonstrated 2.57 ± 0.56 mean dmft score and d component was 2.56 ± 0.04 . Mean pufa score was 1.56 ± 0.40 (Snehal et al., 2015). Untreated percentage is high among Indian children. However, mean pufa is low among Sri Lankan children demonstrating a better oral health status compare to children of the Indian study. However, comparing only the conventional mean dmft value among these study populations gives a wrong impression as mean dmft is high for the present study.

As reported in literature pufa prevalence among 6–7-year-old Brazilian children was 23.7% (Figueiredo et al., 2011). Which deemed lower than 5-7 –year-old children in the present study. This could be due to health system related and family factors which enable oral health seeking behavior among Brazilian children.

The National oral health survey in Philippine has reported pufa prevalence among six-year-old children as 85% and in India among 5–6-year-old children pufa prevalence was 43%, necessitating the huge need of oral health care of children (Grund et al., 2015). However, compared to those study findings pertaining to Southeast Asian countries, rural Sri Lankan children aged 5–7-years still had better oral health with a 34.2% pufa prevalence. This could be attributed to health system differences and other socio-cultural factors in Sri Lankan and Southeast Asian country contexts.

Limitations of the study.

Present study finding could not be generalized to all Sri Lankan 5–7-year-old Grade 1 school children, as differences exist in service provision and utilization in different parts of the country. Clinical examination was done using mouth mirrors and invisible active dental caries could have missed as probing was not done.

Conclusion:

the prevalence of untreated dental caries and their clinical consequences among Grade 1 school children of this rural MOH area was high thus reflecting more severe forms of untreated dental caries compared to most of developed countries. Hence, the research findings should be translated to framing policies and strategies to address the existing burden of untreated dental caries of children within the available oral health care infrastructure in this rural and poverty-stricken region..

Implementing preventive oral health care services targeting early pre-school age would reduce the burden of untreated dental caries and its consequences. pufa/PUFA index should compliment dmft/DMFT index in all epidemiological surveys that provide better insights into one of the most common unmet health need of children across the globe, which is dental caries.

References

Anil, S., & Anand, P. S. (2017). Early Childhood Caries: Prevalence, Risk Factors, and Prevention. *Frontiers in Pediatrics*, 5, 157. <https://doi.org/10.3389/FPED.2017.00157>

Annual Report on Family Health Bureau 2016 Family Health Bureau Ministry of Health Sri Lanka. (2016). http://fhh.health.gov.lk/web/index.php?option=com_phocadownload&view=category&id=66:annual-reports&itemid=150&lang=en#

- Casamassimo, P. S., Thikkurissy, S., Edelstein, B. L., & Maiorini, E. (2009). Beyond the dmft: The Human and Economic Cost of Early Childhood Caries. *The Journal of the American Dental Association*, 140(6), 650–657. <https://doi.org/10.14219/JADA.ARCHIVE.2009.0250>
- Central Bank of Sri Lanka. (2015). <https://www.cbsl.gov.lk/en/publications/economic-and-financial-reports/annual-reports/annual-report-2015>
- FDI World Dental Federation. (2014). Oral Health Worldwide. *Report*, 1–24. <https://www.fdiworlddental.org/oral-health-worldwide>
- Figueiredo, M. J., De Amorim, R. G., Leal, S. C., Mulder, J., & Frencken, J. E. (2011). Prevalence and severity of clinical consequences of untreated dentine carious lesions in children from a deprived area of Brazil. *Caries Research*, 45(5), 435–442. <https://doi.org/10.1159/000330531>
- Filstrup, S. L., Briskie, D., da Fonseca, M., Lawrence, L., Wandera, A., & Inglehart, M. R. (2003). Early childhood caries and quality of life: child and parent perspectives. *Pediatric Dentistry*, 25(5), 431–440. <http://www.ncbi.nlm.nih.gov/pubmed/14649606>
- Grund, K., Goddon, I., Schüller, I. M., Lehmann, T., & Heinrich-Weltzien, R. (2015). *Clinical consequences of untreated dental caries in German 5- and 8-year-olds*. <https://doi.org/10.1186/s12903-015-0121-8>
- Herath, E. M. U. C. K., Nandasena, B. G. T. L., Perera, K., Steepenson, A., Ratnayake, S. C., Sakuma, S., & Miyazaki, H. (2011). *Prevalence, Severity, Pattern of Dental Caries and Care Index of Six Year Old Primary School Children in a Semi Urban Area in Kandy, Sri Lanka*. 16.
- Kassebaum, N. J., Bernabé, E., Dahiya, M., Bhandari, B., Murray, C. J. L., & Marcenes, W. (2015). Global burden of untreated caries: a systematic review and metaregression. *Journal of Dental Research*, 94(5), 650–658. <https://doi.org/10.1177/0022034515573272>
- Levine, R. S. (2021). Childhood caries and hospital admissions in England: a reflection on preventive strategies. *British Dental Journal*, 230(9), 611–616. <https://doi.org/10.1038/s41415-021-2945-8>
- Marcenes, W., Kassebaum, N. J., Bernabé, E., Flaxman, A., Naghavi, M., Lopez, A., & Murray, C. J. L. (2013). Global burden of oral conditions in 1990-2010: a systematic analysis. *Journal of Dental Research*, 92(7), 592–597. <https://doi.org/10.1177/0022034513490168>
- Mehta, A., & Bhalla, S. (2014). Assessing consequences of untreated carious lesions using pufa index among 5-6 years old school children in an urban Indian population. *Indian Journal of Dental Research*, 25(2), 150–153. <https://doi.org/10.4103/0970-9290.135906>
- Ministry of Health Nutrition and Indigenous Medicine. (2018). *National Oral Health Survey Sri Lanka 2015-2016*. <http://www.moh.gov.lk>
- Monse, B., Heinrich-Weltzien, R., Benzián, H., Holmgren, C., & Van Palenstein Helderma, W. (2010). PUFA - An index of clinical consequences of untreated dental caries. *Community Dentistry and Oral Epidemiology*, 38(1), 77–82. <https://doi.org/10.1111/j.1600-0528.2009.00514.x>
- national oral health survey sri lanka - Google Search*. (n.d.). Retrieved July 19, 2022, from https://www.google.com/search?q=national+oral+health+survey+Sri+Lanka&rlz=1C1CHZN_enLK1000LK1000&oq=national+oral+health+survey+&aqs=chrome.69i59j69i57j69i59j0i51217.16525j0j15&sourceid=chrome&ie=UTF-8
- Oziegbe, E. O., & Esan, T. A. (2013). Prevalence and clinical consequences of untreated dental caries using PUFA index in suburban Nigerian school children. *European Archives of Paediatric Dentistry 2013 14:4*, 14(4), 227–231. <https://doi.org/10.1007/S40368-013-0052-5>
- Perera, I., & Ekanayake, L. (2008). Social gradient in dental caries among adolescents in Sri Lanka. *Caries Research*, 42(2), 105–111. <https://doi.org/10.1159/000116874>
- Pitts, N. B., Boyles, J., Nugent, Z. J., Thomas, N., & Pine, C. M. (2005). The dental caries experience of 5-year-old children in England and Wales (2003/4) and in Scotland (2002/3). Surveys co-ordinated by the British Association for the Study of Community Dentistry. *Community Dental Health*, 22(1), 46–56.
- Sheiham, A., & Watt, R. G. (2000). The common risk factor approach: a rational basis for promoting oral health. *Community Dentistry and Oral Epidemiology*, 28(6), 399–406. <https://doi.org/10.1034/J.1600-0528.2000.028006399.X>
- Snehal, P., Hathiwala, S., Raj Srinivasan, S., & Khatri, S. (2015). *Journal of Dentistry and Oral Hygiene Prevalence of untreated*

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