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Original Article

Toothache experiences: findings from 21 years longitudinal survey

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Aim: To describe the pattern of toothache experience in a cohort of children aged 2-5 over 21 years and to find the relationship between previous toothache experience and later reports of toothache to get finding on the most critical period of toothache as a problem in life. **Methods:** This is a secondary data analysis from Indonesia Family Life Survey (IFLS). A total of 1,927 children from IFLS-1 with complete data were included as baseline participants. They were followed up four times within 21 years (age 6-9y, age 9-12y, age 16-19y, age 23-26y). Toothache was based on the question of self-reported toothache experience during the last four weeks. After 21 years, a total of 1,098 individuals could be traced and completed every cohort of the survey. Toothache experiences were reported for frequencies in every cohort and accumulative experiences over 21 years. Logistic regression tests were performed to analyze the association of previous toothache experience and later toothache experience. **Results:** Almost 40% of the respondents reported toothache at least once in their life. The age of 6-9 years is the period when a high percentage of children had teeth-related pain. The experience of toothache at this period was significantly related to every period of age in life. **Conclusions:** The period of early mixed dentition is important. Oral health status in this period is associated with future oral health. A comprehensive dental health prevention program targeting this population is essential to increase the quality of life.

Keywords: Toothache. Longitudinal studies. Oral health.

Introduction

A toothache is a public health problem because of its high prevalence and impacts among all age groups[1-3]. It is often mentioned as the most frequent type of orofacial pain[4] and one of the major consequences of dental and oral health problems among children[5,6]. Toothache was also found to be experienced by 21.8% of adolescents[7]. More than one in ten people ≥65 years were also reported had a recent toothache experience. Moreover, toothache may have detrimental effects on individuals and society. Many studies showed that dental pain reduces sleep duration, increases school/work absences, and affects nutrition, which can negatively impact the quality of life[8-10]. Because of its significant effects on the life of people and society, the Global Goals for Oral Health in the year 2020 includes reduction of the episodes of oral pain in the population as one of the targets on oral health programs[11].

Information that toothache is the most mentioning problem in life is abundant, but understanding the importance of how the sequences is still questioning. Understanding the sequences of toothache experience in a lifetime is crucial to prevent toothache in an appropriate period of life. The individual life-course approach to diseases is the critical period of development, which presumes that having experience of certain conditions in early life can have long term impacts on later health outcomes[12]. We may understand that people in certain periods of life experience a higher rate of toothache in their life. However, there is limited study on toothache using a life course approach. Most of the studies in dental pain are cross-sectional[1,13-15]. Few studies have focused on changes in toothache experiences at two or more points in time[12,16-18].

Some studies examined the trend of toothache over the different periods of life and found socioeconomic conditions were related to toothache experience. Previous studies on toothache using longitudinal data in Brazil highlighted the relation of toothache to maternal education inequality remained stable from childhood and adolescence[2]. The prevalence of toothache among Brazilian adolescents increased and was found linked to race and region[18]. Another study in Brazil showed that the economically disadvantaged group had a higher prevalence of toothache in primary and mixed dentition[17]. Furthermore, a study in Australia found that lower-income family was related to more frequent toothache across the 14-years follow up[12]. Australian adults in the lowest socioeconomic group were found to have an increased prevalence of toothache from 1994-2013[16].

Considering the rare availability of recent studies on dental pain using a life course approach. This study aimed to address these problems by analyzing a 21 years longitudinal study in Indonesia. The main advantage of this longitudinal study was the ability to estimate the trend in toothache over 21 years. Within this study period, children had primary dentition to permanent dentitions and became more independent and mature in adulthood. To our knowledge, there are no studies on toothache in which the same individuals have been followed up over a period as long as 21 years. Most studies examined dental pain using longitudinal data limited from childhood to adolescence[4-6,18]. In particular, this study bridging the understanding of toothache

experience in childhood, adolescence, and adulthood periods. Therefore, the aims were to describe the prevalance of toothache experience in a cohort of children aged 2-5 over 21 years to find the most critical period when toothache became the most serious problem and find the relationship between previous experience and later reports of toothache.

Materials and methods

Study design

This study is a secondary data analysis from the Indonesia Family Life Survey (IFLS). The IFLS is an ongoing longitudinal household and community survey conducted by RAND Corporation in collaboration with many Indonesian institutions. The survey is a broad range survey that includes topics on health. The first survey started in 1993, with four subsequent rounds of data collection in 1997, 2000, 2007, and 2014. The survey dataset was obtained from the RAND Indonesia Family Life Survey website[19].

Setting and participants

The first IFLS in 1993 covered a sample of around 7,200 households across 13 provinces in Indonesia[20]. This IFLS-1 encompassed approximately 83% of the Indonesian population. This survey collected data on individual household and community levels using multistage stratified sampling. This survey's full details, including sampling methods and related protocols, can be found in the overview and field report[20,21].

The baseline data of this present study is the data of IFLS-1 in 1993 for 2-5 years old children as they were at the early stage of primary teeth. The flowchart for the sample collection carried out in this study can be seen in Figure 1. A total of 1,927 children from IFLS-1 with complete data on toothache experience and sociodemographic characteristics were included as baseline participants. This study excluded samples of missing data in all variable interests from statistical analysis. They were followed up four times within 21 years. The IFLS interviewer revisited the household in every follow-up period and conducted direct interviews with respondents from previous surveys. Target respondents who moved from the original residence will be tracked if only they moved in any one of the 13 IFLS provinces.

The participants were at the age of 6-9 years when IFLS-2 was held in 1997 and 9-12 years old when IFLS-3 was held in 2000. The IFLS-4 was conducted in 2007 as the participants reached adolescence at 16-19 years old. The recent survey in 2014 was IFLS-5 when the participants were in early adulthood (age 23-26 years). In 2014, 1,098 individuals (57% of baseline participants) could be traced and completed questionnaires on toothache and demographic characteristics in every follow up period.

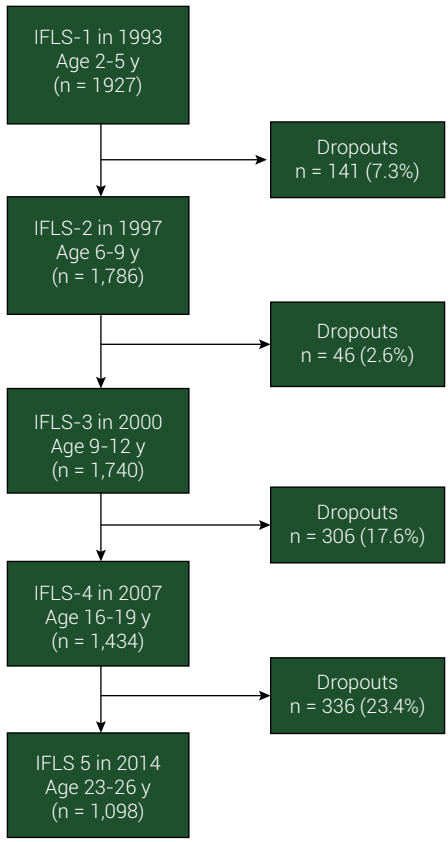

Figure 1. IFLS flowchart in this study

Toothache

Toothache as a variable interest in this study was assessed based on a question of toothache experience in the last four weeks with Yes-No answers. The interviews were conducted in Indonesian and the local language. At the 1st, 2nd, and 3rd follow-up, interviewers collected the data of toothache from parents or guardians, by the question "Has (child's name) ever suffered from a toothache during the past 4 weeks?". The toothache question can be found in the IFLS's book 5, section MAA (acute morbidity), which asked questions on the health status and symptoms of children under 15 years old. At the 4th and 5th follow-up, toothache data was collected from a direct interview of the respondents by the question, "Did you ever experience a toothache in the last 4 weeks?". For adults 15 years or older, the toothache question was presented in IFLS's book 3B, section MA (acute morbidity) that asked questions about adult health symptoms.

Sociodemographic characteristics

In this study, sociodemographic characteristics of respondents were obtained from IFLS-1 data, which were included child sex, maternal education, number of persons in the house, and area of living. Sex was categorized into male and female. The maternal

education variable was simplified into three categories based on the highest education level attended by the participants' mother from baseline data: primary or less, high school, and higher education level. In this study, the number of persons living in the house was categorized into three levels: 3 people or less, 4-5 people, and more than 5 people. The area of living categorization was urban and rural that were based upon 1993 SUSENAS (National Economic and Social Survey) listings obtained from regional BPS (Statistic Indonesia) office[20].

IFLS 1-5 conducted training for field coordinators, supervisors, interviewers, and editors to establish inter-rater reliability[21]. The training was to ensure that people who gathered and entered the data in the field understood the same method for the details and technical knowledge of conducting the survey. This present study examined carefully how the data was collected and coded to minimize potential bias.

Ethics

This study is a secondary data analysis of a publicly available dataset. Procedures of the surveys were reviewed and approved by the Institutional Review Boards (IRBs) in the United States (at RAND) and in Indonesia at the University of Gadjah Mada (UGM). All respondents were given written informed consent before data collection.

Data analysis

Descriptive statistics of sociodemographic characteristics were retrieved from the participants at age 2-5 (IFLS-1). Toothache experiences were reported for frequencies in every cohort and accumulative experience over 21 years. Binary logistic regression tests were performed to analyze the association of previous toothache experiences and later toothache experiences. The level of significance was at $p<0.05$. The analysis was performed using SPSS 25.

Results

There were 1,927 children age 2-5 at baseline in 1993. In the follow-up periods, the number of participants decreased because they either died or moved to other provinces outside the survey areas. The participants were 1,786 in 1997, 1,740 in 2000, 1,434 in 2007, and 1,098 participants in 201completing all follow-ups. For every cohort, sociodemographic characteristics of participants were similar, except for sex. In 1993, the number of male participants was higher, but in 2014 more females (52.1%) were reinterviewed. More than 65% of the participants in this study had low education mothers. In this study, more than 50% of participants lived in rural areas with a family of 4-5 people. Detailed information on the sociodemographic characteristics of respondents can be found in Table 1. The toothache experience varied over time, which was reported among 155 children 2-5 years at baseline, 251 children in 1997, 208 children in 2000, 138 children in 2007, and 131 children in 2014 (Table 1).

Table 1. Distribution of sociodemographic characteristics and toothache experience among participants in every cohort (IFLS1-5)

Variables	IFLS-1 in 1993 (Age 2-5y) (N=1,927)	IFLS-2 in 1997 (Age 6-9y) (N=1,786)	IFLS-3 in 2000 (Age 9-12y) (N=1,740)	IFLS-4 in 2007 (Age 16-19y (N=1,434)	IFLS-5 in 2014 (Age 23-26y) (N=1,098)
Sex					
Male	1,017 (52.8%)	935 (52.4%)	908 (52.2%)	736 (51.3%)	526 (47.9%)
Female	910 (47.2%)	851 (47.6%)	832 (47.8%)	698 (48.7%)	572 (52.1%)
Maternal education					
≤ Primary	1,270 (65.9%)	1199 (67.1%)	1,174 (67.5%)	949 (66.2%)	745 (67.9%)
High schools	547 (28.4%)	487 (27.3%)	469 (27.0%)	405 (28.2%)	288 (26.2%)
Higher edu	110 (5.7%)	100 (5.6%)	97 (5.6%)	80 (5.6%)	65 (5.9%)
Persons per household					
≤ 3	324 (16.8%)	300 (16.8%)	288 (16.6%)	249 (17.4%)	197 (17.9%)
4-5	993 (51.5%)	993 (51.8%)	908 (52.2%)	744 (51.9%)	567 (51.6%)
≥ 6	610 (31.7%)	560 (31.4%)	544 (31.3%)	441 (30.8%)	334 (30.4%)
Area					
Urban	854 (44.3%)	750 (42.0%)	725 (41.7%)	608 (42.4%)	440 (40.1%)
Rural	1,073 (55.7%)	1,036 (58.0%)	1,015 (58.3%)	826 (57.6%)	658 (59.9%)
Toothache					
Yes	155 (8.0%)	251(14.1%)	208 (12.0%)	136(9.5%)	131(11.9%)
No	1,772 (92.0%)	1,535(85.9%)	1,532 (88.0%)	1,298(90.5%)	967(88.1%)

Figure 2 illustrates the trend of toothache prevalence in a lifetime. In an early dentition period at age 2-5 years, toothache was reported by 8% of the population. When they reached the age of 6-9 years, 14% of children had teeth-related pain, which is the highest percentage over the surveys. At the age of 9-12 years, the proportion of participants who reported toothache decreased to 12%. Over the 21 years survey period, the prevalence of self-reported toothache was at the lowest level when they

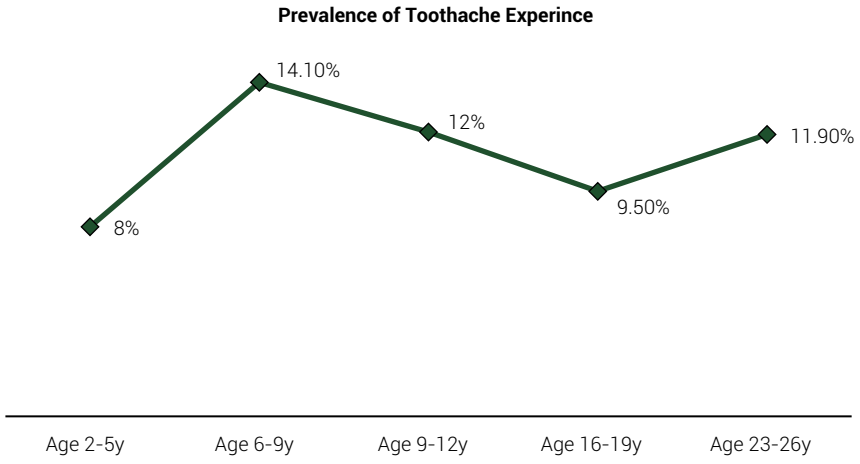

Figure 2. Toothache experiences in every period of life of the cohort participants

reached the age of 16-19 years (9.5%). However, at the period of early adulthood at 23-26 years old, the percentage of participants reporting toothache was higher than the previous period at 11.9%.

The 21 years accumulative reported toothache experience was presented in Table 2. Almost 40% of the respondents reported toothache at least once in their life.

Table 2. Accumulative frequencies of toothache experiences over 21 years (N=1,098)

	N (%)
None	662 (60.3%)
Once	308 (28.1%)
Twice	95 (8.7%)
3 times	27 (2.5%)
4 times	6 (0.5%)

The result from binary logistic regression tests, as shown in Table 3, found that the age of 6-9 years consistently had a significant association with toothache experience in every model. Participants who experienced a toothache at age 6-9 were more likely to experience a toothache in every period of age later in life. Experience toothache at age 2-5 was more likely to experience a toothache at age 6-9 (p=0.036; OR=1.60). Toothache experience at age 9-12 was significantly related only to toothache experience at age 6-9 (p <0.000; OR=2.20). At age 16-19, toothache experince was related to toothache experience at age 6-9 (p<0.000; OR=2.53) and age 9-12 (p=0.001; OR=2.17). The experience of toothache at early adulthood (age 23-26 years) was significantly associated with toothache experience at the age of 6-9 years (p=0.042; OR=1.58) and 16-19 years (p<0.000; OR=2.86).

Table 3. Regression model of the association between previous toothache experience and later toothache experience

Toothache	Model 1 Age 6-9y (N=1786)			Model 2 Age 9-12y (N=1740)			Model 3 Age 16-19y (N=1434)			Model 4 Age 23-26y (N=1098)		
	Sig	OR	95% CI	Sig	OR	95% CI	Sig	OR	95% CI	Sig	OR	95%CI
Age 2-5y	0.036	1.60	1.03-2.47	0.387	1.32	0.70-2.48	0.431	1.28	0.70-2.34	0.885	0.95	0.47-1.91
Age 6-9y				<0.000	2.20	1.42-3.41	<0.000	2.53	1.68-3.81	0.042	1.58	1.02-2.45
Age 9-12y							0.001	2.17	1.39-3.40	0.924	0.97	0.56-1.70
Age 16-19y										<0.000	2.86	1.72-4.76

p < 0.05; Binary Logistic Regression
OR=odds ratio; CI=confidence interval

Discussion

This longitudinal study followed a group of children age 2-5 years in IFLS 1993 over 21 years. The aims were to find the prevalence of toothache in every age period and seek the association between previous toothache experience and later life. The

toothache experience was based on the self-reported toothache during the last four weeks. This study found that the highest percentage of toothache was reported at age 6-9 years. The toothache experience in this period was also related to the toothache experience in subsequent periods of life.

The prevalence of toothache at the age of 2-5 years is 8%, the lowest compared to the later periods of life. This result is lower than the prevalence of toothache in preschool children in Brazil at age 3-4 years with 11.8%[22] and of preschool children age 2-4 years in Australia (15%)[23]. All primary teeth erupt into the mouth by two years of age. Children learn to brush their teeth under supervision in this period of age[24]. Most of the toothache in children found related to caries[6]. Caries development into a symptom needs a period of time[5]. Therefore, most children reported no toothache due to the early tooth wear in this age group. It is essential that children's oral health was assessed from a very young age, and oral health behavior was formulated to prevent negative impacts on later life.

When children reached the age of 6-9 years in 1997, the toothache was reported by 14.1% of the participants in this study. This prevalence is the highest over 21 years of study. The toothache experience in this age period is significantly associated with every period of age in later life, from adolescence to early adulthood. Age of 6–7 years, children go through a critical transition phase of both psychological and biological development[25]. General anxiety, physical injury, and fears such as separation from parents are present during this period of life[25]. This age period is also an early transitional period of the mixed dentition, with exfoliation of primary teeth and eruption of permanent teeth. Tooth mobility in this transition phase can be a factor in reporting toothache[25]. This age is also the period when children become more independent and develop more mature motoric skills[5].

The prevalence of toothache in 6-9 years children in this study is similar to a study in the United States (14%)[26] and slightly lower than toothache experience of children age seven years in Sweden with about 15%[27]. This prevalence is lower than 49.9% reported from 6-12 years old school children in Mexico[14]. However, a study in Canada reported a lower percentage of toothache at around 5% of children[28]. The difference in toothache prevalence can be related to many factors, including the development context of different locations and countries, variations of the disease level between populations, health system management and actions on population oral health problems, and also methodologies applied in every study.

This study found that in the late phase of mixed dentition, children age 9-12, reported less frequent toothache experience than the previous age period (12%). This result was lower than a study in South Brazil for children 8-12 years that reported toothache experience for 17.3% of the population[29] and a study for children age 9-12 years in Australia (27.4%)[12]. This number is also lower than a study in Taiwan where more than 30% of children experience dental pain during the past year[15]. In this period of life, children begin to have the ability to judge their behavior and emotion, including the awareness of their physical appearance and other's thought[30].

In the adolescent period (age 16-19 years), 9.5% of the participants in this study reported toothache experience in the last four weeks. This result is slightly lower

than around 10% of Canadian adolescents who reported toothache[28]. A study of adolescence age 15-19 in Brazil found that 28.3% of participants experience toothache during the last six months[31]. Adolescence is an intermediate period between childhood and adulthood, characterized by intense psychological and physical changes[32]. In this transitional phase, individuals may involve in particular behaviors that can compromise their health status[4]. The experience of toothache in this period is significantly related to the toothache experience in childhood.

Self-reported toothache at the age of 23-26 years was 11.9%. This number is lower than a study in Brazil among 20-29 years adult (17.2%)[33] and a young adult population in Canada 14%[28]. The experience of toothache in this period was significantly associated with toothache experience at early mixed dentition and adolescence. A similar result was also found in which followed individuals from late childhood into early adulthood. The DMFT and CPI values at age 18 years were associated with DMFT and CPITN scores at younger ages[34]. Over 21 years of study, almost 40% of the respondents had ever experienced a toothache.

This study reported that having toothache experience in early life was an important determinant for future toothache experience in this life course study[5]. The high prevalence of toothache in the early mixed dentition period and its significant association with future toothache experiences suggest the need to create comprehensive dental health prevention programs targeting this population to reduce the impact of pain on their quality of life.

The strengths of this study were the participants' follow-up over 21 years and the high number of participants involved. This study could be a reason to describe the trend in toothache experience over time. A longitudinal study design had a reliable estimate of the change in toothache experience over the 21 years of the study. The life course models are useful to understand the long-term effects of exposures during childhood, adolescence, young adulthood, and later adult life on chronic disease[35].

Some limitations are found in this study. First is the loss of follow-up at the survey. A considerable number of participants in this study cohort were lost at the IFLS-4 and IFLS-5 when they reached adolescence and adulthood. Second, due to secondary data analysis of this study, data available limited in terms of information related to oral health, limiting the authors to draw a more comprehensive analysis. Future studies may consider more comprehensive variables, including socioeconomic factors and other oral health behaviors, such as dietary habits, tooth brushing frequency, to explore the mechanisms of the statistical association found in this study.

Data availability

Datasets related to this article can be found at https://www.rand.org/well-being/social-and-behavioral-policy/data/FLS/IFLS/access.html.

Authors' contribution

Elyda Misrohmasari: Design, Interpretation, Drafting, Revising

Dimas Wicaksono: Acquisition, Analisis, Revising

Hestieyonini Hadnyanawati: Design, Interpretation, Revising

Berlian Prihatiningrum: Interpretation, Revising

All of the authors listed have been read and approved to submit the manuscript to this journal. All authors agree to be accountable for all aspects of the work.

References

1. Muirhead VE, Quayyum Z, Markey D, Weston-Price S, Kimber A, Rouse W, et al. Children's toothache is becoming everybody's business: where do parents go when their children have oral pain in London, England? A cross-sectional analysis. BMJ Open. 2018 Feb 28;8(2):e020771. doi: 10.1136/bmjopen-2017-020771.
2. Freire MCM, Jordão LMR, Peres MA, Abreu MHNG. Six-year trends in dental pain and maternal education inequalities among Brazilian adolescents. Community Dent Oral Epidemiol. 2019 Dec;47(6):454-60. doi: 10.1111/cdoe.12483.
3. Wan S, Tao L, Liu M, Liu J. Prevalence of toothache in Chinese adults aged 65 years and above. Community Dent Oral Epidemiol. 2021 Dec;49(6):522-32. doi: 10.1111/cdoe.12640.
4. Freire MCM, Nery NG, Jordão LMR, Abreu MHNG. Individual and contextual determinants of dental pain in adolescents: Evidence from a national survey. Oral Dis. 2019 Jul;25(5):1384-93. doi: 10.1111/odi.13100.
5. Hall-Scullin E, Whitehead H, Milsom K, Tickle M, Su TL, Walsh T. Longitudinal Study of Caries Development from Childhood to Adolescence. J Dent Res. 2017 Jul;96(7):762-7. doi: 10.1177/0022034517696457.
6. Boeira GF, Correa MB, Peres KG, Peres MA, Santos IS, Matijasevich A, et al. Caries is the main cause for dental pain in childhood: findings from a birth cohort. Caries Res. 2012;46(5):488-95. doi: 10.1159/000339491.
7. Tôrres LHN, Zanatta J, Pizolato RA, Grillo CM, Frias AC, Sousa MLR. Reasons related to tooth loss among adolescents in São Paulo, Brazil. Braz J Oral Sci. 2014;13(1):37-42. doi: 10.20396/bjos.v13i1.8640930.
8. Krisdapong S, Prasertsom P, Rattanarangsima K, Sheiham A. School absence due to toothache associated with sociodemographic factors, dental caries status, and oral health-related quality of life in 12- and 15-year-old Thai children. J Public Health Dent. 2013 Fall;73(4):321-8. doi: 10.1111/jphd.12030.
9. Barasuol JC, Santos PS, Moccelini BS, Magno MB, Bolan M, Martins-Júnior PA, et al. Association between dental pain and oral health-related quality of life in children and adolescents: a systematic review and meta-analysis. Community Dent Oral Epidemiol. 2020 Aug;48(4):257-63. doi: 10.1111/cdoe.12535.
10. da Fonseca Cumerlato CB, Rotta RN, de Oliveira LJC, Corrêa MB. # Dentalpain: what do the brazilian Instagram® users want to mean? Braz J Oral Sci. 2020;19:e208591. doi: 10.20396/bjos.v19i0.8658591.
11. Hobdell M, Petersen PE, Clarkson J, Johnson N. Global goals for oral health 2020. Int Dent J. 2003 Oct;53(5):285-8. doi: 10.1111/j.1875-595x.2003.tb00761.x.
12. Ghorbani Z, Peres MA, Liu P, Mejia GC, Armfield JM, Peres KG. Does early-life family income influence later dental pain experience? A prospective 14-year study. Aust Dent J. 2017 Dec;62(4):493-9. doi: 10.1111/adj.12531.
13. Paulino MR, Clementino MA, Santos HB de P, et al. Self-Medication for toothache and its associated factors in children and adolescents. Pesq Bras Odontoped Clin Integr. 2019;19:e4348:1-9. doi: 10.4034/PBOCI.2019.191.36.

14. Escoffié-Ramirez M, Ávila-Burgos L, Baena-Santillan ES, Aguilar-Ayala F, Lara-Carrillo E, Minaya-Sánchez M, et al. Factors Associated with Dental Pain in Mexican Schoolchildren Aged 6 to 12 Years. Biomed Res Int. 2017;2017:7431301. doi: 10.1155/2017/7431301.

15. Miao NF, Wang TC, Chang FC, Lee CH, Chi HY, Huang LJ, Pan YC. Prevalence and association of pain experiences, medication literacy, and use of medication among children and adolescents in Taiwan. J Pediatr Nurs. 2019 May-Jun;46:e64-e71. doi: 10.1016/j.pedn.2019.03.002.

16. Peres KG, Luzzi L, Harford J, Peres MA. Socioeconomic gradients in toothache experience among Australian adults: A time trend analysis from 1994 to 2013. Community Dent Oral Epidemiol. 2019 Aug;47(4):324-32. doi: 10.1111/cdoe.12461.

17. Costa FDS, Costa CDS, Chisini LA, Wendt A, Santos IDSD, Matijasevich A, et al. Socio-economic inequalities in dental pain in children: A birth cohort study. Community Dent Oral Epidemiol. 2021 Jun 16. doi: 10.1111/cdoe.12660.

18. Costa F, Wendt A, Costa C, Chisini LA, Agostini B, Neves R, et al. Racial and regional inequalities of dental pain in adolescents: Brazilian National Survey of School Health (PeNSE), 2009 to 2015. Cad Saude Publica. 2021 Jun;37(6):e00108620. doi: 10.1590/0102-311X00108620.

19. RAND Corporation. Indonesia Family Life Survey. Santa Monica, California: RAND; 2020 [cited Jun 4]. Available from: https://www.rand.org/well-being/social-and-behavioral-policy/data/FLS/IFLS/download.html.

20. Frankenberg E, Karoly LA, Gertler P, Achmad S, Agung IGN, Hatmadji SH, et al. The 1993 Indonesian Family Life Survey: overview and field report. RAND Corporation. Demographic Institute; 1995 [cited 2021 Jun 4]. 63 p. Available from: https://www.rand.org/content/dam/rand/pubs/drafts/2007/DRU1195.1.pdf.

21. Strauss J, Witoelar F, Sikoki B. The Fifth Wave of the Indonesia Family Life Survey: Overview and Field Report. RAND Labor & Population; 2016 Mar. doi: 10.7249/wr1143.1.

22. Aillón IEV, Tello G, Corrêa-Faria P, Abanto J, Oliveira LB, Bönecker M. Dental Pain in Preschool Children Using the Brazilian Dental Discomfort Questionnaire and its Association with Dental Caries and Socioeconomic Factors. Pediatr Dent. 2020 Jan;42(1):22-7.

23. Dogar F, Kruger E, Dyson K, Tennant M. Oral health of pre-school children in rural and remote Western Australia. Rural Remote Health. 2011;11(4):1869.

24. Shah R, Donde R, Mitra D, Rodrigues S, Shetty G, Prithyani S. Oral Hygiene Tips for Infants, Toddlers, Kids. World J Adv Sci Res. 2018;1(2):16-20.

25. Barreto KA, Dos Prazeres LD, Lima DS, Soares FC, Redivivo RM, da Franca C, et al. Factors associated with dental anxiety in Brazilian children during the first transitional period of the mixed dentition. Eur Arch Paediatr Dent. 2017 Feb;18(1):39-43. doi: 10.1007/s40368-016-0264-6.

26. Lewis C, Stout J. Toothache in US children. Arch Pediatr Adolesc Med. 2010 Nov;164(11):1059-63. doi: 10.1001/archpediatrics.2010.206.

27. Dahlander A, Soares F, Grindefjord M, Dahllöf G. Factors Associated with dental fear and anxiety in children aged 7 to 9 years. Dent J (Basel). 2019 Jul;7(3):68. doi: 10.3390/dj7030068.

28. Ravaghi V, Quiñonez C, Allison PJ. Oral pain and its covariates: findings of a Canadian population-based study. J Can Dent Assoc. 2013;79:d3.

29. Schuch HS, Correa MB, Torriani DD, Demarco FF, Goettems ML. Perceived dental pain: determinants and impact on brazilian schoolchildren. J Oral Facial Pain Headache. 2015 Spring;29(2):168-76. doi: 10.11607/ofph.1414.

30. Santos PS, Martins-Júnior PA, Paiva SM, Klein D, Torres FM, Giacomin A, et al. Prevalence of self-reported dental pain and associated factors among eight- to ten-year-old Brazilian schoolchildren. PLoS One. 2019 Apr;14(4):e0214990. doi: 10.1371/journal.pone.0214990.

31. Santiago BM, Valença AM, Vettore MV. Social capital and dental pain in Brazilian northeast: a multilevel cross-sectional study. BMC Oral Health. 2013 Jan;13:2. doi: 10.1186/1472-6831-13-2.

32. Sawyer SM, Azzopardi PS, Wickremarathne D, Patton GC. The age of adolescence. Lancet Child Adolesc Health. 2018 Mar;2(3):223-8. doi: 10.1016/S2352-4642(18)30022-1.

33. Constante HM, Bastos JL, Peres KG, Peres MA. Socio-demographic and behavioural inequalities in the impact of dental pain among adults: a population-based study. Community Dent Oral Epidemiol. 2012 Dec;40(6):498-506. doi: 10.1111/j.1600-0528.2012.00701.x.

34. Lu HX, Wong MC, Lo EC, McGrath C. Trends in oral health from childhood to early adulthood: a life course approach. Community Dent Oral Epidemiol. 2011 Aug;39(4):352-60. doi: 10.1111/j.1600-0528.2011.00611.x.

35. Dos Santos Costa F, Agostini BA, Schuch HS, Britto Correa M, Goettems ML, Demarco FF. Parent-child interaction and stimulation in early life can be related to caries in primary dentition? Hypotheses from a life-course approach. Med Hypotheses. 2019 Sep;130:109291. doi: 10.1016/j.mehy.2019.109291