



Factors affecting the utilization of oral health services among preschool children in Yogyakarta City

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ABSTRACT

Background: The utilization of oral health services is a crucial component for preschool children, serving as both a preventive and curative measure for their oral health. The purpose of this study was to examine the factors that influence the utilization of oral health services in preschool children in Yogyakarta City based on Andersen's Behavioral Model of Health Services. **Methods:** An analytical observational study using a cross-sectional design was conducted involving 100 children and their parents at three kindergartens in the Klitren Urban Village, Gondokusuman District, Yogyakarta City. The variables studied in this research included the child's sex, age, parents' education level, parents' occupation, parents' knowledge, attitudes, and practice, parents' income, parents' perception of their child's oral and general health, the child's experience of toothache, and oral health status assessed using the dmf-t index. Data analysis was conducted using the *chi-square* test, Kruskal-Wallis test, Mann-Whitney U test, and binary logistic regression analysis. **Findings:** A total of 38% of children had utilized oral health services. The result of multivariate analysis shows that predisposing factors, supporting factors, and need factors simultaneously affect the utilization of oral health services in preschool children by 39.2%. Parental education level (*p-value*= 0.004; Exp (B)= 12.065, 95% CI [2.210-65.880]), parental knowledge, attitudes, and practice (*p-value*= 0.012; Exp (B)= 4.374; 95% CI [1.379-13.872]), children's experience of toothache (*p-value*= 0.036; Exp (B)= 0.357; 95% CI [0.136-0.937]), age (*p-value*= 0.041; Exp (B)= 1.942; 95% CI [1.029-3.665]), and parental occupation (*p-value*= 0.041; Exp (B)= 3.716; 95% CI [1.053-13.115]) were significantly associated with utilization of oral health services. **Conclusion:** This study concludes that predisposing factors, enabling factors, and need factors are factors that influence the utilization of oral health services among preschool children in Yogyakarta City. **Novelty/Originality of this article:** This study is novel in applying Andersen's Behavioral Model to identify parental and child-related factors influencing oral health service utilization among preschool children.

KEYWORDS: oral health services utilization; preschool children; Yogyakarta.

1. Introduction

In 2015, the Indonesian Ministry of Health launched a program called “Indonesia Sehat Bebas Karies 2030”. This program is implemented through the 2015-2019 National Action Plan for Dental and Oral Health Services. The latest Riskesdas result in 2018 showed an increase in the prevalence of dental caries in Indonesia in all age groups, from 72.6% in

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2013 to 88.8% in 2018 (Riskesdas Ministry of Health of the Republic of Indonesia, 2013; Riskesdas Ministry of Health of the Republic of Indonesia, 2018). The Riskesdas also reported the prevalence of dental caries in the child population. The prevalence of dental caries in children aged 5-9 years was 92.6%, while the prevalence of dental caries in children aged 3-4 years was 81.5% with an average dmft index of 6.2. The Special Region of Yogyakarta Province was reported to have a proportion of dental caries problems reaching 47.7%. This proportion indicates that Yogyakarta has a higher prevalence of dental caries compared to the national average of 45.3% (Riskesdas Ministry of Health of the Republic of Indonesia, 2018). A study conducted by Pandu & Lisfrizal (2021) reported that the city of Yogyakarta has a dental caries prevalence among children aged 3-6 years of 84.1% with an average def-t of 5.80.

Preschool-aged children are a vulnerable group when it comes to oral disease (Gultom & Dyah, 2017). Dental caries is one of the oral diseases that is still commonly experienced by children. The World Health Organization (WHO) states that 520 million children in the world suffer from dental caries that attacks primary teeth (WHO, 2022). The most common type of caries affecting preschool children's primary teeth is rampant caries (Ayele & Amare, 2020). The main factors contributing to rampant caries include microflora, host, teeth, substrate (*diet*), and time (Owen et al., 2017 cited in WHO, 2019). Other factors as predisposing factors for the occurrence of rampant caries, are influenced by several things, such as parental factors, diet, the habit of drinking milk from a bottle until falling asleep, demographics, socioeconomic status, poor oral hygiene, and health service factors (Isaksson et al., 2019; Colombo et al., 2019; Li et al., 2020).

The utilization of oral health services is an important component for preschool children as a preventive and curative measure for children's oral health (Sisman et al., 2016). Data from the 2018 Basic Health Research shows that only 10.2% of the Indonesian population has received treatment from dental professionals. The population aged 3-4 years in Indonesia has a very low percentage of receiving dental care, namely 4.3%. As many as 96.3% have never been treated or visited a dentist. In addition, only 5.4% of the 3-4 age group undergoes oral hygiene counseling. The city of Yogyakarta is the region in the Special Region of Yogyakarta with the highest proportion of residents who have received dental care, at 21.50%. Additionally, 21.66% have visited a dental professional for oral hygiene and health counseling. A total of 10.63% of the population in the 3-4 age group in the Special Region of Yogyakarta had received treatment from dental health workers (Riskesdas Ministry of Health of the Republic of Indonesia, 2018). Andersen's Behavioral Model of Health Services is a model developed by Andersen (1995) to study the factors that determine an individual's utilization of health services. This model is based on a national quantitative survey that aims to understand the use of health services by families. Three main factors are used to explain the utilization of health services, namely predisposing factors (e.g., age, education), enabling factors (e.g., income), and need factors (e.g., health status) (Gu & Dupre, 2020; Ledere et al., 2021).

2. Methods

2.1 Study setting

Gondokusuman district is one of districts in Yogyakarta City. This district has an area of 3.99 km² consisting of five subdistricts, namely Terban, Klitren, Demangan, Kotabaru, and Baciro. Gondokusuman district has access to complete public facilities, particularly in terms of the availability of health care facilities. These health care facilities consist of two community health centers with one auxiliary community health center, five hospitals, 13 pharmacies, six pharmacy stores, 22 doctor practices/clinics, and 16 polyclinics. Klitren subdistrict is the subdistrict in Gondokusuman district with the easiest access to healthcare facilities, including hospitals, maternity hospitals, and community health centers, making it convenient for residents of Klitren subdistrict to access healthcare services (BPS Kota Yogyakarta, 2021). This study involved kindergarten respondents who attend school or live

in the Klitren sub-district, Gondokusuman district area of Yogyakarta, along with their parents. The selection of this area was based on its strategic geographical location in terms of access to health services.

2.2 Study design and sample size

This study design was an analytical observation study using a cross-sectional study design. The respondents were preschool children and parents aged 3-6 years old and children attending kindergarten in the Klitren sub-district, Gondokusuman district, Yogyakarta. The sample population came from three kindergartens in the Klitren sub-district, which were willing to participate in this study, with a total population of 121 students. Based on Solvin's formula, the minimum sample size required for this study was 93 people, so the population size was sufficient to conduct the study. Respondents in this study were those who met the inclusion criteria, agreed to participate, and could follow the research process by completing the research consent form (informed consent). Inclusion criteria: 1) Preschool children aged 3-6 years and parents represented by mothers; 2) Attending kindergarten in the Klitren subdistrict; 3) Willing to participate in the study from start to finish; 4) Children and parents in good health. Exclusion criteria: 1) Children under 3 years old and over 6 years old; 2) Children who are not present on the day of oral health examination.

2.3 Data collection

Data collection was conducted through a direct survey using a questionnaire that was completed independently by the parents and an oral examination. Oral examination to evaluate the condition of the children's teeth was recorded based on the WHO odontogram form (2013). The following characteristics of primary dentition status were recorded: decayed (d), missing (m), and filled (f) teeth, and the dmft (d + m + f) index was then calculated for each subject. The data was obtained through a series of structured questions arranged in such a way in the research questions arranged in such a way in the research questionnaire covering assessment of identity (age, sex, parents occupation, parents' education level, parental income, and health insurance ownership), knowledge, attitudes, and practices (KAP) of parents, utilization of oral health services, experiences of children's toothache in 12 months, and respondents' perceptions related to children's oral health. The research questionnaire related to parents' knowledge, attitude, and practice regarding oral health was a modification of the research questionnaire by Xu et al. (2018) in China. The questionnaire was translated into Indonesian and modified, then a pre-test of the final version was conducted. This research questionnaire also underwent validity and reliability tests. The instrument consisted of 16 questions, 4 questions related to knowledge, 3 questions related to attitudes, and 9 questions related to behavior.

The items related to knowledge consisted of questions related to preventive actions/care for dental caries. There were three answer choices for the items related to knowledge, namely correct, incorrect, and don't know. Respondents who answered correctly were given a score of 1, while respondents who answered incorrectly or did not know were given a score of 0. The questions related to attitude contained statements related to oral health. Oral examinations were undertaken in school using a dental mirror, a probe, and a headlight. The questions related to attitude had two answer choices, namely "agree" and "disagree". Respondents who showed a positive attitude were given a score of 1, and respondents who showed a negative attitude were given a score of 0. The questions about practices related to oral health consisted of questions about children's eating habits and the behavior of children and parents related to children's toothbrushing. Similar to the questions related to attitudes, for the questions related to practices, respondents who showed a positive attitude were given a score of 1 and respondents who showed a negative attitude were given a score of 0. The total score was calculated by adding the scores from 16 questions, with the final score ranging from 0 to 15.

2.4 Statistical analysis

Data were entered into Excel 2019 and analyzed using software statistics with a 95% confidence level ($p < 0.05$). The research data were first analyzed using the Kolmogorov-Smirnov normality test and the Levene test for homogeneity. The data was analyzed using univariate, bivariate, and multivariate analyses. Univariate analysis was performed to display the respondent characteristics. Bivariate analysis was performed to analyze the correlation between two variables, namely the independent variable and the dependent variable. Bivariate analysis used the *chi-square*, Kruskal-Wallis, and Mann-Whitney test. Multivariate analysis was performed to analyze data with many variables and suspected interrelationships between the variables. Multivariate analysis uses the binary logistic regression test to analyze independent variables that affect the dependent variable and the extent of the effect of the independent variable and the dependent variable.

3. Results and Discussion

3.1 Respondent characteristics

Data collection was conducted in three kindergartens in the Klitren subdistrict, Gondokusuman district area, which were willing to participate in the research. The total number of students in the three kindergartens was 121. Eleven students did not attend school during the oral examination, leaving 110 children to undergo the oral examination. A total of 10 other children were eliminated from the study population because their ages met the inclusion criteria. Thus, the total number of respondents included in this study was 100 children and their parents.

3.1.1 Demographic and socioeconomic characteristics of respondents

The demographic and socioeconomic characteristics of respondents were examined based on sex, age, parents' occupation, parents' education level, health insurance coverage, and parents' income as presented in Table 1. The study population consisted of preschool children aged 3-6 years, the majority of whom were female (52%). Most children were 6 years old (51%) with a median (interquartile range) age of 6.00 (5.00-6.00).

Table 1. Demographic and socioeconomic characteristics (N=100)

Variables	n (%)
Sex	
Female	52 (52%)
Male	48 (48%)
Parents' occupation	
Professional/staff/employee	26 (26%)
Others	74 (74%)
Parents' education level	
> 12 years	51 (51%)
≤ 12 years	49 (49%)
Parental income	
> IDR 3.500.000	38 (38%)
IDR 2.500.000 – IDR 3.500.000	14 (14%)
IDR 1.500.000 – IDR 2.500.000	16 (16%)
< IDR 1.500.000	32 (32%)
Health insurance ownership	
Yes	78 (78%)
No	24 (24%)
Median (interquartile range)	
Age	6.00 (5.00-6.00)

3.1.2 Parents' knowledge, attitudes, and practice

The variables of parental knowledge, attitude, and parent's practice (KAP) were assessed based in the answers to 16 questions consisting of the dimensions of parental knowledge, attitude, and practice regarding oral health. The knowledge dimension consisted of 4 questions, the attitude dimension consisted of 3 questions, and the practice dimension consisted of 9 questions. The distribution of parents' knowledge-related answers regarding their children's oral health is presented in Table 2.

Table 2. Distribution of parental knowledge responses regarding children's oral health (N=100)

Questions	True	False	Don't know
The use/application of fluoride can prevent cavities	75 (75%)	4 (4%)	21 (21%)
Pit and fissure sealants can protect children from cavities	51 (51%)	2 (2%)	47 (47%)
Brushing teeth twice a day can protect children from cavities	97 (97%)	2 (2%)	1 (1%)
Regular dental and oral health checkups can help identify dental and oral health problems	100 (100%)	0 (0%)	0 (0%)

A total of 75% respondents answered correctly, 4% answered incorrectly, and 21% of respondents answered that they did not know when asked whether fluoride application can prevent cavities. Regarding the question about whether pits and fissure sealant can protect children from cavities, 51 respondents answered correctly (51%), 2 respondents answered incorrectly (2%), and 47 respondents answered that they don't know (47%). Most respondents (97%) answered correctly, 2% answered incorrectly, and 1% answered "don't know" to the question about brushing teeth twice a day protecting children from cavities. All respondents answered correctly (100%) to the question stating that regular dental and oral health checkups can help identify dental and oral health problems.

Table 3 shows the distribution of respondents' answers based on parents' attitudes toward children's oral health. The majority of respondents disagreed with the statement that dental and oral health is not related to general health (76%), indicating that the majority of respondents believe that dental health is related to general health. A total of 61% of respondents agreed that the mother's dental health affects the child's dental health, while 39% disagreed. Almost all respondents (95%) disagreed that decayed baby teeth do not require treatment.

Table 3. Distribution of parental attitude responses regarding children's oral health (N=100)

Questions	Agree	Disagree
Dental and oral health is not related to general health	24 (24%)	76 (76%)
Poor dental health in mothers will affect their children's dental health	61 (61%)	39 (39%)
Baby teeth don't need to be treated if they are cavities or decayed	5 (5%)	95 (95%)

Table 4 presents the distribution of respondents' answers to questions regarding children's eating behaviors. A total of 66% of respondents exhibited positive behaviors related to children's eating habits from birth to 4 months of age, namely, only giving breast milk. Only 3% of children exhibited negative behaviors, namely drinking carbonated beverages > 2 times a day, while 97% of respondents showed positive behaviors by answering < 1 time a day. Respondents reported that most children consumed snacks after meals at least once a day (47%) and consumed candy/chocolate < 1 time a day (59%).

Table 4. Distribution of child eating behavior questionnaire responses (N=100)

Questions	n (%)
Feeding habits of children from birth to 4 months of age	66 (66%)
Breast milk only	19 (19%)
Breast milk and formula	3 (3%)
Breast milk and complementary foods	12 (12%)
Feeding habits/consumption of cariogenic foods/drinks	

Carbonated drinks	
< 1 time per day	97 (97%)
Once per day	0 (0%)
> 2 times a day	3 (3%)
Snacks after meals	
< 1 time per day	15 (15%)
Once a day	47 (47%)
> 2 times a day	38 (38%)
Candy/Chocolate	
< 1 time per day	59 (59%)
Once a day	23 (23%)
> 2 times a day	18 (18%)
Children eat desserts or drink sweet beverages before bedtime	
Rarely	55 (55%)
Often	33 (33%)
Never	12 (12%)

Table 5 presents the distribution of responses regarding children's and parents' practice related to oral health. Children who consume desserts or sweet drinks before bedtime tend to brush their teeth before bedtime (50%). Most parents reported that they started teaching their children to brush their teeth at the age of 1 (47%). Most parents engage in positive behaviors, such as helping their children brush their teeth every day (70%) and checking their children's teeth after they brush (47%).

Table 5. Distribution of child and parent behavioral responses regarding children's oral health

Questions	n (%)
Children brushing their teeth after eating dessert or drinking sweet drinks before bedtime	
Rarely	50 (52.6%)
Often	31 (32.6%)
Never	7 (7.4%)
Children start getting used to brushing their teeth	
Since they were 6 months old	37 (37%)
1 year old	45 (35%)
2 years old	14 (14%)
3 years old	2 (2%)
Never	2 (2%)
How often do parents help children brush their teeth	
Every day	70 (70%)
Every week	1 (1%)
Sometimes	24 (24%)
Rarely	5 (5%)
Never	0 (0%)
How often do parents check their children's teeth after brushing	
Every day	47 (47%)
Every week	3 (3%)
Sometimes	34 (34%)
Rarely	8 (8%)
Never	8 (8%)

Table 6 presents data on scores related to parents' knowledge, attitudes, and practice (KAP) regarding oral health. The total score was calculated by adding up all the scores from the 16 questions, with a final score ranging from 0 to 15. Based on the accumulated knowledge, attitude, and practice scores, the median score for knowledge, attitude, and practice was 11.00 with an interquartile range of 10.00-12.00.

Table 6. Knowledge, attitude, and practice scores of parents regarding oral health (N=100)

Variables	Median (interquartile range)
Knowledge, attitude, and parents' practice related of oral health	11.00 (10.00-12.00)

3.1.3 Children's behaviors and oral health

Data related to children's oral health and behavior are presented in Table 7. Table 7 shows that most children (67%) have never experienced a toothache in the last 12 months, while 29% of children experience a toothache sometimes. Based on parents' perceptions of their children's oral health, most respondents (49%) had a positive perception, while only 12% had a negative perception.

Table 7. Children's oral behavior and health (children's toothache experience in 12 months, parental perception of children's oral health, parental perception of children's general health, and dmf-t score) (N=100)

Questions	n (%)
Children's experience of a toothache in 12 months	
Never	67 (67%)
Sometimes	29 (29%)
Often	2 (2%)
Unknown	2 (2%)
Parents' perception of their children's oral health	
Very good	5 (5%)
Good	49 (49%)
Moderate	34 (34%)
Poor	12 (12%)
Parents' assessment of their child's general health	
Very good	15 (15%)
Good	63 (63%)
Moderate	21 (21%)
Poor	1 (1%)
Median (interquartile range)	
d	4.00 (2.00-8.75)
m	0.00 (0.00-0.00)
f	0.00 (0.00-0.00)
dmf-t	4.00 (2.00-9.00)

Similarly, regarding parents' perception of their children's general health, most respondents rated their children's general health as good (63%), followed by 21 respondents who rated it as fair (21%), 15% rated it as very good, and only 1 respondent rated it as poor (1%). Children's caries experience was assessed based on the dmf-t index. The median dmf-t value was 4.00 with an interquartile range of 2.00-9.00. The median decay (d) value also showed a value of 4.00 with an interquartile range of 2.00-8.75. Based on the results of the children's oral cavity examination, 83% of children had dental caries. Meanwhile, 17% of children did not have dental caries.

3.2 Utilization of oral health services

As shown in Table 8, 38% of children have used oral health services in the last 12 months. A total of 62% of children have never used oral health services, and those who have used them did so more than 12 months ago. Children who have used oral health services in the last 12 months have mostly visited the dentist only once (47.4%). Most of the costs incurred were for dental cleanings (38.4%), followed by dental fillings (37.4%), and dental extractions (36.7%). Children who utilized oral health services in the past 12 months mostly visited the dentist only once (47.4%). Most of the costs incurred by parents for their children's visits to the dentist were between IDR 100,000 and IDR 500,000 (50%).

Table 8. Characteristics of oral health service utilization in children

Variables	n (%)
Utilization of Oral Health Services (N=100)	
≤ 12 months	38 (38%)
Never or > 12 months	62 (62%)
Number of visits to the dentist within 12 months (n=38)	
1 time	18 (47.4%)
2 times	14 (36.8%)
3 times	3 (7.9%)
> 3 times	3 (7.9%)
Cost of visits to the dentist in the last 12 months (n=38)	
< IDR 100,000	13 (34.2%)
IDR 100,000-IDR 500,000	19 (50%)
> IDR 500,000	6 (15.8%)

Several reasons encourage children to visit the dentist within 12 months. Oral cavity problems have the highest percentage that encourages children to visit the dentist, namely 47.3%. The second highest percentage is dental caries, which is 37.7%. The third highest percentage is dental abscess, which is 13.3%. The fourth highest percentage is dental tartar, which is 12.7%. The fifth highest percentage is dental decay, which is 10.3%. The sixth highest percentage is dental extraction, which is 9.3%. The seventh highest percentage is dental filling.

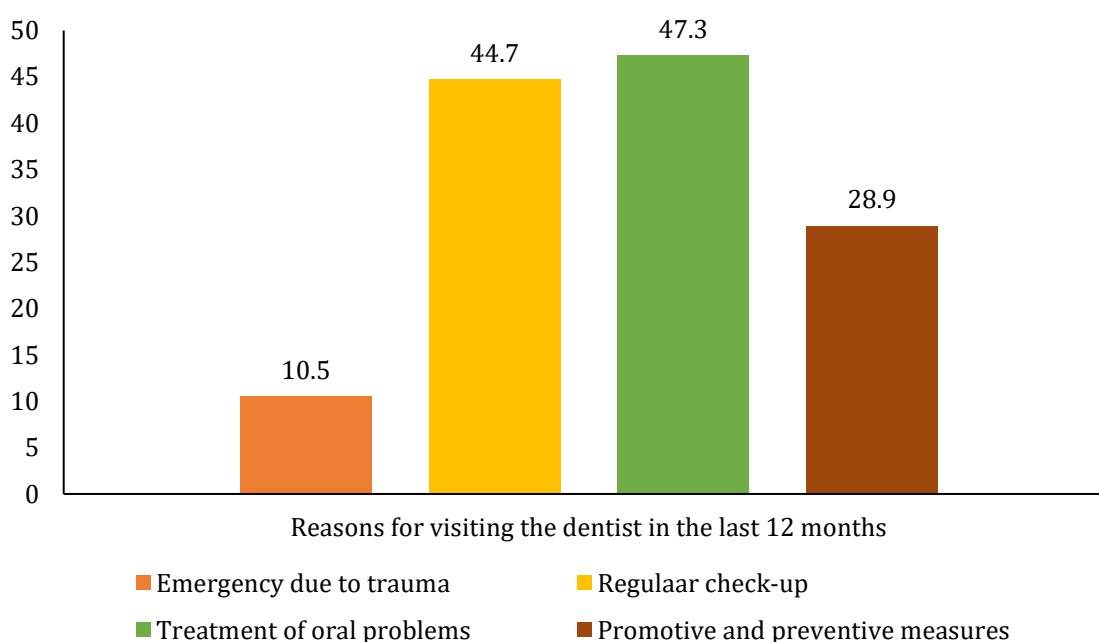


Fig. 1. Percentage of respondents by reason for visiting the dentist in the past 12 months

3.3 Relationship between predisposing factors and utilization of oral health services

Table 9 presents a study of the relationship between various variables of predisposing factors and the utilization of oral health services in preschool children. The *chi-square* test conducted on the gender variable showed no difference between genders in the utilization of oral health services in preschool children (*p-value*=0.356). The *chi-square* test conducted between parents' knowledge, attitudes, and practice related to oral health and the utilization of oral health services in preschool children showed a significant difference in two variables (*p-value*=0.035).

Similar results were also found in the relationship between the variable of education level and the utilization of oral health services in children ($p\text{-value} < 0.001$). Meanwhile, there was a significant difference between the variable of parental occupation and the utilization of oral health services in preschool children ($p\text{-value} = 0.016$). The Mann-Whitney test between age and the utilization of oral health services in preschool children showed no significant difference ($p\text{-value} = 0.248$).

Table 9. Relationship between various predisposing factors and the utilization of oral health services in preschool children (N=100)

Variables	Utilization of oral health services		$p\text{-value}$
	≤ 12 months	Never/ > 12 months	
Sex			0.356 ^α
Female	22 (22%)	30 (30%)	
Male	16 (16%)	32 (32%)	
Parents' education level			$< 0.001^{\alpha}$
> 12 years	28 (28%)	23 (23%)	
≤ 12 years	10 (10%)	23 (39%)	
Parents' occupation			0.016 ^α
Professional/staff/employee	15 (15%)	11 (11%)	
others	23 (23%)	51 (51%)	
Knowledge, attitude, and parents' practice			0.035 ^α
> 11	21 (21%)	21 (21%)	
≤ 11	17 (17%)	41 (41%)	
Median (interquartile range)			
Ages	5.00 (5.00-6.00)	6.00 (5.00-6.00)	0.248 ^α

^αchi-square, $p < 0.05$

^γMann Whitney-U, $p < 0.05$

3.4 Relationship between enabling factors and utilization of oral health services

The relationship between parental income and health insurance coverage with the utilization of oral health services is presented in Table 10. Bivariate analysis between various independent variables supporting factors and dependent variables was performed using the *chi-square* test and Kruskal-Wallis test. Bivariate analysis of supporting factors for the utilization of oral health services in preschool children was performed using the Kruskal-Wallis test for the variable of parental income and the *chi-square* test for the variable of health insurance ownership. The results of the Kruskal-Wallis test showed a significant difference between parental income and the utilization of oral health services in preschool children ($p\text{-value} = 0.040$). Conversely, there was no significant difference between health insurance ownership and the utilization of oral health services in preschool children ($p\text{-value} = 0.306$).

Table 10. Relationship between various supporting factors and utilization of preschool children's oral health services (N=100)

Variables	Utilization of oral health services		p
	≤ 12 months	Never/ > 12 months	
Parental income			0.356 ^α
$> \text{IDR } 3,500,000$	20 (20%)	18 (18%)	
$\text{IDR } 2,500,000 - \text{IDR } 3,500,000$	5 (5%)	9 (9%)	
$\text{IDR } 1,500,000 - \text{IDR } 2,500,000$	3 (3%)	13 (13%)	$< 0.001^{\alpha}$
$< \text{IDR } 1,500,000$	10 (10%)	22 (22%)	
Health insurance ownership			0.016 ^α
Yes			
No	15 (15%)	11 (11%)	

^α chi-square, $p < 0.05$

^βKruskal-Wallis H, $p < 0.05$

3.5 Relationship between need factors and utilization of oral health services

A comparison of oral health service utilization among preschool children based on need factors is presented in Table 11. Bivariate analysis was used to determine the relationship between need factors and oral health service utilization among preschool children, using the Kruskal-Wallis test and Mann Mann-Whitney test. The Kruskal-Wallis test showed no significant difference between parents' perceptions of oral health (p -value=0.282) and parents' perceptions of general health (p -value=0.817) on the utilization of oral health services in preschool children. The majority of parents who gave very good and good perceptions of their children's oral health reported that their children had never used oral health services and that the services used were more than 12 months old.

Table 11. Relationship between various types of needs factors and the utilization of preschool children's oral health services (N=100)

Variables	Utilization of oral health services		p
	≤12 months	Never/>12 months	
Parents' perception of their children's oral health			0.282 ^β
Very good	1 (1%)	4 (4%)	
Good	17 (17%)	32 (32%)	
Moderate	15 (15%)	19 (19%)	
Poor	5 (5%)	7 (7%)	
Parents' assessment of their child's general health			0.817 ^β
Very good	7 (7%)	8 (8%)	
Good	22 (22%)	41 (41%)	
Moderate	9 (9%)	12 (12%)	
Poor	0 (0%)	1 (1%)	
Children's experience of a toothache in 12 months			0.133 ^β
Never	22 (22%)	45 (45%)	
Sometimes	14 (14%)	15 (15%)	
Often	1 (1%)	1 (1%)	
Unknown	1 (1%)	1 (1%)	
Median (interquartile range)			
dmf-t	5.00 (0.75-10.00)	4.00 (2.00-7.00)	0.299 ^γ

^βKruskal-Wallis H, $p < 0.05$

^γMann Whitney-U, $p < 0.05$

No significant difference was found in the Kruskal-Wallis test between toothache experience and oral health service utilization in preschool children (p -value=0.133). The majority of respondents stated that their children had never experienced toothache in the past 12 months and that their children did not utilize oral health services. Similar results were obtained in the bivariate analysis using the Mann-Whitney test between the dmf-t index and the utilization of oral health services among preschool children, showing no significant difference between the two variables (p -value=0.299). The median dmf-t value among children who utilized oral health services within 12 months was 5.00 with an interquartile range of 0.75-10.00, while the median dmf-t value in children who never used or used health services more than 12 months ago was 4.00 with an interquartile range of 2.00-7.00.

3.6 The influence various factors of predisposing factors, enabling factors, and need factors on the utilization of oral health services

The influence of predisposing factors, enabling factors, and need factors on the utilization of oral health services in preschool children in Yogyakarta City was examined using multivariate analysis involving all independent variables in the predisposing factors, enabling factors, and need factors, namely gender, age, parental education level, parental occupation, parental knowledge, attitudes, and practice, parental income, health insurance coverage, parental perceptions of their children's oral health, parental perceptions of their

children's general health, children's experience of toothache in the last 12 months, and dmft. Multivariate analysis was performed using binary logistic regression testing ($\alpha = 0.05$ and 95% CI). Binary logistic regression was used when the dependent variable referred to two categories, such as "Yes" and "No," which were valued at 0 and 1. Binary logistic regression does not require classical assumption tests such as normality tests, multicollinearity tests, heteroscedasticity tests, linearity tests, and autocorrelation tests because binary logistic regression analysis is not based on ordinary least squares. The assumption tests required in binary logistic regression include model goodness-of-fit tests, simultaneous hypothesis tests, coefficient of determination tests, and partial hypothesis. This study involved a multicollinearity test to determine whether the regression model used had correlations between the independent variables.

The criterion for binary logistic regression testing is that independent variables significantly influence the dependent variable if the p-value is <0.05 . Table 12 presents the results of the binary logistic regression test, which shows that the parents' education level, knowledge, attitudes, and practice, the child's experience of toothache, age, and the parents' occupation have a significant partial influence on the utilization of oral health services. The data indicate that the increase in the utilization of oral health services among preschool children over 12 months is most influenced by the parents' education level, knowledge, attitudes, and practice, the child's experience of toothache, age, and the parents' occupation. Children whose parents have an education level of > 12 years are twelve times more likely to utilize oral health services compared to children whose parents have an education level of ≤ 12 years (p -value=0.004; Exp (B)=12.065; CI95% [2.210–65.880]).

Table 12. Results of binary logistic regression testing factors affecting the utilization of oral health services in preschool children

Variables	Utilization of oral health services (≤ 12 months; Never/ > 12 months)						
	B	W	Df	Exp(B)	95% CI		p
					Bottom	Top	
Sex	-1.021	3.524	1	0.360	0.124	1.046	0.060
Age	0.664	4.193	1	1.942	1.029	3.665	0.041
Parents' education level	2.490	8.268	1	12.065	2.210	65.880	0.004
Parents' occupation	1.313	4.163	1	3.716	1.053	13.115	0.041
Knowledge, attitude, and practice	1.476	0.589	1	6.278	1.379	13.872	0.012
Parental income	0.476	1.966	1	1.610	0.827	3.34	0.161
Health insurance ownership	-0.233	0.117	1	0.792	0.208	3.012	0.732
Parents' perception of their children's oral health	-0.260	0.375	1	0.771	0.336	1.771	0.540
Parents' assessment of their child's general health	0.402	0.831	1	1.495	0.630	3.545	0.362
Children's experience of a toothache	-1.029	4.381	1	0.357	0.136	0.937	0.036
dmf-t	0.018	0.067	1	1.018	0.893	1.160	0.792

^aBinary logistic regression, $p < 0.05$

B = regressin coefficient

W = Wald

Df = degrees of freedom

Exp(B) = exponent value

CI = confidence interval

Children whose parents have good knowledge, attitudes, and practice are four times more likely to utilize oral health services compared to children whose parents have poor knowledge, attitudes, and practice (p -value=0.012; Exp (B)=4.374; CI95% [1.379-13.872]). Children who experienced a toothache in the past 12 months are 0.357 times more likely to utilize oral health services compared to children who did not experience a toothache in the past 12 months (p -value=0.036; Exp (B)=0.357; CI95% [0.136-0.937]). Older children tend to utilize oral health services twice as much as children who are younger (p -value=0.041;

Exp(B)=1.942; CI95% [1.029-3.665]). Children whose parents have high-income occupations are four times more likely to utilize oral health services compared to children whose parents have low-income occupations (p -value=0.041; Exp(B)=3.716; 95% CI [1.053-13.115]).

Thus, the higher the parents' level of education, the greater the chance that children will utilize oral health services. The better the parents' knowledge, attitudes, and practice, the greater the chance that children will utilize oral health services. Children who experience toothache are more likely to utilize oral health services than children who do not experience toothache. Older children are more likely to utilize oral health services compared to younger children. Children whose parents have high-income occupations tend to have access for their children to oral health services. Other variables do not have a significant partial effect on the utilization of oral health services in preschool children.

This study involved 100 children attending kindergarten in Klitren Village, Gondokusuman District, Yogyakarta City, along with their parents. This study reported a prevalence of dental caries in preschool children of 83%, while only 38% of preschool children utilized oral health services within 12 months. This study reports that treatment of oral cavity problems and routine check-ups are common reasons that encourage children to visit the dentist. This reason is similar to the study by Nagdev et al. (2023), which states that routine check-ups and dental fillings are the main reasons for children to utilize oral health services.

An analysis was conducted between predisposing factors, enabling factors, and need factors on the utilization of oral health services in preschool children. A binary logistic regression test was conducted involving all variables in the predisposing factors, enabling factors, and need factors on the utilization of oral health services. All factors simultaneously influenced the utilization of oral health services in preschool children by 39.2%. Another 60.8% were other factors that could influence the utilization of oral health services in preschool children. These factors are factors that were not examined in this study, for example, parents' oral health literacy, perceptions regarding children's need to access/obtain oral health care services, the number of children in the family, parents' bad experiences with visits to the dentist, and parents' sense of coherence regarding their children's oral health (Goettems et al., 2012; Maffioletti et al., 2019; Nagdev et al., 2023; Opydo-Szymaczek et al., 2021; Sisman et al., 2016).

Based on the results of multivariate analysis, it was found that parents' education level, knowledge, attitudes, and practice, as well as children's experience of toothache, have a significant influence on the utilization of oral health services among preschool children in Yogyakarta City. Children whose parents have more than 12 years of education are twelve times more likely to utilize oral health services compared to children whose parents have ≤ 12 years of education (p -value=0.004; Exp (B)=12.065; CI95% [2.210-65.880]). Children whose parents have good knowledge, attitudes, and practice are four times more likely to utilize oral health services compared to children whose parents have poorer knowledge, attitudes, and practice (p -value=0.012; Exp (B)=4.374; CI95% [1.379-13.872]). Children who experience toothache are more likely to utilize oral health services compared to children who do not experience toothache (p -value=0.036; Exp (B)=0.357; CI95% [0.136-0.937]).

Age and occupation also showed a significant influence on the utilization of oral health services among preschool children in the multivariate analysis. Older children are twice as likely to utilize oral health services compared to younger children (p -value=0.041; Exp(B)=1.942; 95% CI [1.029-3.665]). Children whose parents have jobs with higher incomes are more likely to utilize oral health services than children whose parents have jobs with low incomes (p -value=0.041; Exp(B)=3.716; CI95% [1.053-13.115]). The utilization of oral health services in children is influenced by various factors, one of which is the parents' education level (Nagdev et al, 2023). The higher the parents' education level, the greater the likelihood of children utilizing oral health services. Parents with higher education levels are reported to be more concerned about their children's oral health (Dumitrescu et al., 2022). Education level is related to parents' awareness of their children's

oral health, enabling them to teach good habits to create good oral health conditions in children (Nagdev et al., 2023). Education enables individuals to acquire knowledge and skills related to health, thereby increasing their awareness of healthy living behaviors and preventive care (Raghupathi & Raghupathi, 2020). Among preschool-aged children, education and parental awareness are the primary predictors in the decision-making process to bring children to the dentist, whether for disease-related treatment or preventive care. In the preschool-aged group, education and parental awareness levels are the primary predictors in the decision-making process for taking children to the dentist, whether for treatment related to disease or prevention. Parents should encourage children to utilize oral health services by regularly visiting the dentist (Mishra et al., 2018; Al Agili & Farsi, 2020; Nagdev et al., 2023).

The relationship between parental education and the utilization of oral health services in preschool children is based on the fact that parents with higher education tend to access more information from various media about oral hygiene compared to parents with lower levels of education (Ali & Jalal, 2018). Additionally, individuals with higher education have better abilities in understanding and critically thinking about the treatment plans provided by health workers, stating that children with highly educated parents or caregivers tend to utilize oral health services (Gu & Dupre, 2020; Xu et al., 2018).

The relationship between the level of education and occupation of parents and the utilization of oral health services is in accordance with a study in China by Xu et al. (2018) which stated that both are related to the utilization of oral health services in preschool children within the last 12 months. Individuals with higher education tend to have better jobs than those with lower education (Ali & Jalal, 2018). Individuals with low-income jobs have a low chance of utilizing oral health services (Adeniyi & Oyapero, 2020). Parents with high-income jobs are more likely to provide access to oral health services for their children (Nagdev et al., 2023). Parents' knowledge, attitudes, and practice toward children's oral health significantly influence the utilization of oral health services among preschool children (p -value=0.012). These results align with other studies which state that parents' knowledge, attitudes, and practice have a significant relationship with the utilization of health services (Gao et al., 2020; Sharma & Vajanapoom, 2022). This relationship is related to children's oral habits, which are formed based on parents' knowledge, attitudes, and practice regarding oral health. Parents' knowledge, attitudes, and practice are important aspects of children's oral health. Parents' knowledge, attitudes, and practice are influenced by their level of education. This is because a higher level of education enables parents to accept health education programs (Ali & Jalal, 2018).

Parents' knowledge and attitudes influence children in utilizing health services. This finding is supported by the fact that children still depend on their parents to visit the dentist (Ayele & Amare, 2020). Parents who have good knowledge and attitudes toward oral health tend to provide access for their children to utilize oral health services (Hu et al., 2022). Research in Malaysia on the Libyan population, on the other hand, reported that positive knowledge, attitudes, and practice of parents do not necessarily indicate positive practices (Azañedo et al., 2017). The study also reported that most parents who have positive knowledge, attitudes, and practice toward the utilization of oral health services (79.6%), 64.9% of parents will only take their children to oral health care facilities if the children complain of pain. Children's experience of toothache showed a significant influence on the utilization of oral health services in multivariate analysis (p =0.036). Study in China stated that the need factor is the main factor that is the main reason for children to utilize oral health services (Xu et al., 2018). Parents with poor knowledge, attitudes, and practice tend to ignore information about diseases and cannot identify oral problems in children, so parents will only provide access for their children to utilize oral health services if their children complain of pain (Sami et al., 2016). The results of this study support the assumption that most people in developing countries utilize oral health services only when they feel pain. Toothache encourages children to utilize oral health services so that the pain they experience can be relieved. The experience of toothache is the most common reason for preschool children to utilize oral health services. Other studies report that the majority

of children utilize oral health services when they feel pain. Parents will not take their children to the dentist if their children do not experience toothache. When parents assess that their children do not feel the need and do not provide support for oral care, then children are not given the opportunity to access oral health services. Parents will assess that their child needs dental care if the child has serious problems accompanied by pain and symptoms of pain that are verbally communicated by the child (AlHumaid et al., 2018; Azañedo et al., 2017; Colombo et al., 2019).

Age was found to influence the utilization of oral health services. Some study reported a significant influence on visits to oral health services for older children compared to younger children (Xu et al., 2018). Younger children did not regularly utilize oral health services compared to older children. This is because oral health problems can increase as children get older. Additionally, older children are better able to clearly communicate pain and discomfort to their parents compared to younger children (Gao et al., 2020). Enabling factors include parental income, which is significantly associated with the utilization of oral health services in preschool children ($p=0.040$). This aligns with the study in Brazil, which found a significant relationship between parental income and the utilization of oral health services in preschool children (Gonçalves et al., 2024). Parents with high incomes are more likely to provide their children with access to oral health services (Shahrabani, 2015). Individuals with high incomes are more likely to utilize oral health services compared to individuals with low incomes (Sahab et al., 2022). Children with low-income parents are less likely, or never, to visit a dentist. Low-income residents tend to focus more on using their income to meet basic needs, such as food, making it very unlikely that they will use their income for routine visits to oral health facilities (Gao et al., 2020).

Strong collaboration is needed between the government and dental healthcare professionals to create various policies and programs to improve the utilization of oral healthcare services for children. Increasing the utilization of oral healthcare services for children can involve health education and promotion, such as regular visits to schools every 6 months. Educational programs can be conducted in collaboration with the Department of Education and Sports, and involve parents of students. Parents, as role models for their children, must be continuously motivated to always in still good oral health habits in them (Nagdev et al., 2023).

The weakness of this study is that it uses a cross-sectional study as the research design. This study is limited to examining the phenomenon at a single point in time. Additionally, the research location was limited to a single region, so it could not represent the characteristics of preschool children in Yogyakarta City. Another weakness is that data is collected through questionnaires completed independently by respondents, without direct researcher assistance. Based on the consideration of the characteristics of parents as respondents, the study used two different media for data collection: print media and electronic media. Additionally, variables related to parents' perceptions of the need for their children to utilize oral health services were not included in this study.

Despite the study's limitations, this review involved sample size calculation and met the minimum sample size criteria. This study also has another strength: it involves direct dental examinations of the population conducted by a single dentist. The third strength is the research process, which was carried out up to multivariate analysis, allowing us to determine the extent of the influence of each variable. Another strength is the inclusion of various independent variables in this study, enabling these variables to report the most influential factors on the utilization of oral health services among preschool children in Yogyakarta City.

4. Conclusions

A total of 38% of preschool children utilized oral health services in the past 12 months. Predisposing factors, enabling factors, and need factors are factors that influence the utilization of oral health services in preschool children in Yogyakarta City. Parental education level, knowledge, attitudes, and practice, children's experience with toothaches,

age, and parental occupation have a significant influence on the utilization of oral health services in preschool children in Yogyakarta City in multivariate analysis. There needs to be collaboration between dental health professionals and the government to improve the utilization of oral health services.

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Authors' Contributor

F.W., and E.W., collected data. FW Writing – Review & Editing. E. W., and I. B., are directing the writing of the manuscript.

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Ethical Review Broad Statement

The ethical clearance letter was submitted to the Medical and Health Research Ethics Commission of the Faculty of Medicine, Universitas Gadjah Mada. The ethical clearance application was published on May 5, 2023, with letter number KE/FK/0717/EC/2023.

Informed Consent Statement

All children's parents or caregivers received documents that explained the study's aim and also informed consent. Only children with the consent form and cooperation were examined.

Data Availability Statement

All data are limited access but available on request.

Conflicts of Interest

The authors declare no conflict of interest.

Declaration of Generative AI Use

During the preparation to compile this article, the authors used DeepL Translate and Grammarly to identify the best words and sentences for this manuscript. After using both tools, the authors reviewed and edited all content of the manuscript and tool responsibility for the content of the publication.

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References

- Adeniyi, A. A., & Oyapero, A. (2020). Predisposing, enabling and need factors influencing dental service utilization among a sample of adult Nigerians. *Population Medicine*, 2(December), 1-9. <https://doi.org/10.18332/popmed/128504>
- Al Agili, D. E., dan Farsi, N. J. (2020). Need for dental care drives utilisation of dental services among children in Saudi Arabia. *International Dental Journal*, 70(3), 183–192. <https://doi.org/10.1111/idj.12539>
- AlHumaid, J., El Tantawi, M., AlAgl, A., Kayal, S., Al Suwaiyan, Z., & Al-Ansari, A. (2018). Dental visit patterns and oral health outcomes in Saudi children. *Saudi journal of medicine & medical sciences*, 6(2), 89. https://doi.org/10.4103/sjmms.sjmms_103_17
- Ali, M. S., & Jalal, H. (2018). Higher education as a predictor of employment: The world of work perspective. *Bulletin of Education and Research*, 40(2), 79-90. <http://files.eric.ed.gov/fulltext/EJ1209685.pdf>
- Alyafei, N. A., Jaleel, B. N. F., & Mathew, T. (2020). Knowledge, attitude and behavior towards oral health care among parents/caregivers of children with disabilities in Qatar. *Medical & Clinical Research*, 5(10), 251-257. <https://doi.org/10.35248/2161-1122.20.10.559>
- Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: does it matter?. *Journal of health and social behavior*, 1-10. <https://doi.org/10.2307/2137284>
- Ayele, M., & Amare, M. (2020). Determinants of dental Caries among preschool children in Dessie town, 2019: a case-control study. *International Journal of Oral and Dental Health*, 6, 118. <https://doi.org/10.23937/2469-5734/1510118>
- Azañedo, D., Hernández-Vásquez, A., Casas-Bendezú, M., Gutiérrez, C., Agudelo-Suárez, A. A., & Cortés, S. (2017). Factors determining access to oral health services among children aged less than 12 years in Peru. *F1000Research*, 6, 1680. <https://doi.org/10.12688/f1000research.12474.1>
- BPS Kota Yogyakarta. (2021). *Kecamatan Gondokusuman dalam angka 2021*. BPS Kota Yogyakarta. <https://jogjakota.bps.go.id/id/publication/2021/09/24/83e8ba5353c8a35a0552146c/kecamatan-gondokusuman-dalam-angka-2021.html>
- Gu, D., & Dupre, M. E. (Eds.). (2021). *Encyclopedia of gerontology and population aging*. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-69892-2_876-1
- Colombo, S., Gallus, S., Beretta, M., Lugo, A., Scaglioni, S., Colombo, P., ... & Paglia, L. (2019). Prevalence and determinants of early childhood caries in Italy. *European Journal of Paediatric Dentistry*, 20(4), 267-273. <https://doi.org/10.23804/ejpd.2019.20.04.02>
- Dumitrescu, R., Sava-Rosianu, R., Jumanca, D., Balean, O., Damian, L. R., Fratila, A. D., ... & Galuscan, A. (2022). The impact of parental education on schoolchildren's oral health—a multicenter cross-sectional study in Romania. *International Journal of Environmental Research and Public Health*, 19(17), 11102. <https://doi.org/10.3390/ijerph191711102>
- Gao, X., Ding, M., Xu, M., Wu, H., Zhang, C., Wang, X., ... & Si, Y. (2020). Utilization of dental services and associated factors among preschool children in China. *BMC Oral health*, 20(1), 9. <https://doi.org/10.1186/s12903-019-0996-x>
- Goettems, M. L., Ardenghi, T. M., Demarco, F. F., Romano, A. R., & Torriani, D. D. (2012). Children's use of dental services: influence of maternal dental anxiety, attendance pattern, and perception of children's quality of life. *Community dentistry and oral epidemiology*, 40(5), 451-458. <https://doi.org/10.1111/j.1600-0528.2012.00694.x>
- Gonçalves, I. D. C., Coelho, V. S., Ramos-Jorge, J., Mourão, P. S., Soares, K. H., Ramos-Jorge, M. L., & Fernandes, I. B. (2024). Utilization of dental services by preschool children: prevalence and associated factors. *Brazilian Oral Research*, 38, e081. <https://doi.org/10.1590/1807-3107bor-2024.vol38.0081>
- Gultom, E., & Dyah, R. R. R. (2017). *Konsep dasar pelayanan asuhan kesehatan gigi dan mulut I: Bahan ajar keperawatan gigi*. Kementerian Kesehatan Republik Indonesia.

- Hu, X., Fan, X., Tian, J., Zhang, B., & Huang, R. (2023). Utilization of dental care service and associated factors among pre-school children in northwest China over the past decade. *BMC oral health*, 23(1), 54. <https://doi.org/10.21203/rs.3.rs-1528698/v1>
- Isaksson, H., Koch, G., Alm, A., Nilsson, M., Wendt, L. K., & Birkhed, D. (2019). Parental factors in early childhood are associated with approximal caries experience in young adults—A longitudinal study. *Community dentistry and oral epidemiology*, 47(1), 49-57. <https://doi.org/10.1111/cdoe.12421>
- Li, J., Fan, W., Zhou, Y., Wu, L., Liu, W., & Huang, S. (2020). The status and associated factors of early childhood caries among 3-to 5-year-old children in Guangdong, Southern China: a provincial cross-sectional survey. *BMC oral health*, 20(1), 265. <https://doi.org/10.1186/s12903-020-01253-w>
- Maffioletti, F., Vettore, M. V., Rebelo, M., Herkrath, F., Queiroz, A., Herkrath, A. P., ... & Rebelo Vieira, J. (2020). Predisposing, enabling, and need characteristics of dental services utilization among socially deprived schoolchildren. *Journal of public health dentistry*, 80(2), 97-106. [10.1111/jphd.12349](https://doi.org/10.1111/jphd.12349)
- Mishra, A., Pandey, R. K., Chopra, H., & Arora, V. (2018). Oral health awareness in school-going children and its significance to parent's education level. *Journal of Indian Society of Pedodontics and Preventive Dentistry*, 36(2), 120-124. https://doi.org/10.4103/JISPPD.JISPPD_1172_17
- Nagdev, P., Iyer, M. R., Naik, S., Khanagar, S. B., Awawdeh, M., Al Kheraif, A. A., ... & Alsadon, O. (2023). Andersen health care utilization model: A survey on factors affecting the utilization of dental health services among school children. *PloS one*, 18(6), e0286945. <https://doi.org/10.1371/journal.pone.0286945>
- Opydo-Szymaczek, J., Borysewicz-Lewicka, M., Andrysiak, K., Witkowska, Z., Hoffmann-Przybylska, A., Przybylski, P., ... & Gerreth, K. (2021). Clinical consequences of dental caries, parents' perception of child's oral health and attitudes towards dental visits in a population of 7-year-old children. *International journal of environmental research and public health*, 18(11), 5844. <https://doi.org/10.3390/ijerph18115844>
- Owen, L., & Corfe, B. (2017). The role of diet and nutrition on mental health and wellbeing. *Proceedings of the nutrition society*, 76(4), 425-426. <https://doi.org/10.1017/S0029665117001057>
- Raghupathi, V., & Raghupathi, W. (2020). The influence of education on health: an empirical assessment of OECD countries for the period 1995–2015. *Archives of public health*, 78(1), 20. <https://doi.org/10.1186/s13690-020-00402-5>
- Riskesdas Ministry of Health of the Republic of Indonesia. (2018). *Laporan Nasional Riskesdas 2018*. Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan Republik Indonesia. <https://repository.kemkes.go.id/book/1323>
- Sahab, D. A., Bamashmous, M. S., Ranauta, A., & Muirhead, V. (2022). Socioeconomic inequalities in the utilization of dental services among adults in Saudi Arabia. *BMC Oral Health*, 22(1), 135. <https://doi.org/10.1186/s12903-022-02162-w>
- Sami, A., Fatima, K., Moin, H., Bashir, R., & Ahmed, J. (2016). Relationship of parental knowledge and attitude with oral health status of children in Karachi East. *British Journal of Medicine & Medical Research*, 14(9), 1–9. <https://doi.org/10.9734/BJMMR/2016/24767>
- Sharma, S., & Vajanapoom, N. (2022). Factors affecting oral health service utilization of differently-abled school children in Kathmandu, Nepal. *Journal of Public Health and Development*, 20(2), 98–109. <https://doi.org/10.55131/jphd/2022/200208>
- Shahrabani, S., Benzion, U., Machnes, Y., & Gal, A. (2015). The use of dental services for children: implications of the 2010 dental reform in Israel. *Health Policy*, 119(2), 117–126. <https://doi.org/10.1016/j.healthpol.2014.11.007>
- Sisman, N., Bora, N., Catar, R. O., Karacayli, U., Cimilli, H., Koksai, L., Oktay, I., dan Mumcu, G. (2016). Utilization of dental service and quality of life in preschool children. *International Journal of Experimental Dental Science*, 5(1), 16–22. <https://doi.org/10.5005/jp-journals-10029-1117>

- Sistani, M. M. N., Virtanen, J., Yazdani, R., & Murtomaa, H. (2017). Association of oral health behavior and the use of dental services with oral health literacy among adults in Tehran, Iran. *European journal of dentistry*, 11(02), 162-167. <https://doi.org/10.4103/ejd.ejd 332 16>
- Pandu, S. P U., & Lisfrizal, H. (2021). The development of the impact of early childhood caries on the quality of life of children aged 3-5 years at Paedodonti RSGM Baiturrahmah. *Denta: Jurnal Kedokteran Gigi*, 15(2), 92-99. <https://doi.org/10.30649/denta.v15i2.6>
- Xu, M., Yuan, C., Sun, X., Cheng, M., Xie, Y., & Si, Y. (2018). Oral health service utilization patterns among preschool children in Beijing, China. *BMC oral health*, 18(1), 31. <https://doi.org/10.1186/s12903-018-0494-6>
- WHO. (2019). *Ending Childhood Dental Caries*. World Health Organization. <https://www.who.int/publications-detail-redirect/ending-childhood-dental-caries-who-implementation-manual>
- World Health Organization. (2022). *Oral health*. World Health Organization. <https://www.who.int/news-room/fact-sheets/detail/oral-health>

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