# FACTORS RELATED TO ORAL HEALTH KNOWLEDGE, ATTITUDE, AND PRACTICE AMONG ADOLESCENT IN JEMBER, INDONESIA: A CROSS-SECTIONAL STUDY

Factores relacionados con el conocimiento, la actitud y la práctica de la salud bucal entre adolescentes en Jember, Indonesia: un estudio transversal

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## ABSTRACT

**Aim:** The study aimed to analyze the factors related to oral health knowledge, attitude, and practice among adolescents in Jember, Indonesia.

**Material and Methods:** The population of this study was junior secondary school students in Jember, Indonesia. Sampling was generated using cluster random sampling with a total of 398 students from eight different schools. A questionnaire on oral health knowledge, attitudes, and practices was given to the students. Data on the family's socioeconomic characteristics were collected from the school database of parents. The correlation of socioeconomic status (gender, school, mother and father education, father and mother occupation, monthly income, number of children) and oral health knowledge, attitude, and practice were first analyzed statistically using the univariate Spearman test ($p<0.05$). Significant correlation variables from univariate analysis were then entered into a multi-regression model to find the strongest predictor of oral health knowledge, attitude, and practice ($p<0.05$).

**Results:** The age of adolescents in this study was 12-16. Multi regression analysis showed a significant relation between gender, ethnicity, school, and oral health knowledge. Females were more likely to have higher knowledge than males ($p=0.003$). Students from public schools were more likely to have a higher knowledge than students from private schools ($p=0.000$). Javanese adolescents have significantly higher knowledge than Maduranese ($p=0.028$) or other ethics ($p=0.022$). Mother education and gender were significantly associated with the attitude. Adolescents with higher mother education were more likely to have higher attitude scores ($p=0.000$). Females were significantly related to higher attitude scores ($p=0.016$).

**Conclusions:** This study highlights the need for an oral health promotion program among adolescents in Jember, Indonesia, that addresses socioeconomic backgrounds, predominantly male, students from private schools and uneducated mothers.

**Keywords:** *Oral health; Adolescent health; Health knowledge, attitudes, practice; Social determinants of health; Health inequities; Gender inequity.*

## RESUMEN

**Objetivo:** Analizar los factores relacionados con los conocimientos, actitudes y prácticas de salud bucodental en adolescentes de Jember, Indonesia.

**Material y métodos:** La población de este estudio estuvo compuesta por estudiantes de secundaria de primer ciclo de Jember, Indonesia. El muestreo se realizó mediante un muestreo aleatorio por conglomerados con un total de 398 estudiantes de ocho escuelas diferentes. Se administró a los estudiantes un cuestionario sobre conocimientos, actitudes y prácticas de salud bucodental. Los datos sobre las características socioeconómicas de la familia se recopilaron de la base de datos de padres de la escuela. La correlación entre el nivel socioeconómico (género, escuela, educación de la madre y el padre, ocupación de ambos padres, ingresos mensuales, número de hijos) y los conocimientos, actitudes y prácticas de salud bucodental se analizó estadísticamente mediante la prueba univariante de Spearman ($p<0,05$). Las variables de correlación significativas del análisis univariante se introdujeron posteriormente en un modelo de regresión múltiple para encontrar el predictor más sólido de los conocimientos, actitudes y prácticas de salud bucodental ($p<0,05$).

**Resultados:** La edad de los adolescentes en este estudio fue de 12 a 16 años. El análisis de regresión múltiple mostró una relación significativa entre género, etnia, escuela y conocimientos de salud bucodental. Las mujeres tenían mayor probabilidad de tener mayores conocimientos que los hombres ($p=0,003$). Los estudiantes de escuelas públicas tenían mayor probabilidad de tener mayores conocimientos que los estudiantes de escuelas privadas ($p=0,000$). Los adolescentes javaneses tienen un conocimiento significativamente mayor que los madurenses ($p=0,028$) u otros conocimientos éticos ($p=0,022$). La educación de la madre y el género se asociaron significativamente con la actitud. Los adolescentes con mayor educación materna tenían mayor probabilidad de tener puntuaciones de actitud más altas ($p=0,000$). Las mujeres mostraron una relación significativa con puntuaciones de actitud más altas ($p=0,016$).

**Conclusiones:** Este estudio destaca la necesidad de un programa de promoción de la salud bucodental entre los adolescentes de Jember, Indonesia, que aborde los entornos socioeconómicos, la predominancia de hombres, estudiantes de escuelas privadas y madres sin educación.

**Palabras clave:** *Salud bucal; Salud del adolescente; Conocimientos, actitudes y práctica en Salud; Determinantes sociales de la salud; Inequidades en salud; Equidad de género.*

## INTRODUCTION

Oral health conditions impact nearly 3.5 billion people globally, with around 75% of cases occurring in middle-income countries.[1] Indonesia is an upper middle-income country where oral health conditions affect 57.6% of the population.[2] These conditions affect 55.6% of adolescents aged 10-14 in Indonesia.[3]

According to WHO, adolescence is a transition period from childhood to adulthood with an age range of 10-19 years.[4] Adolescence is marked by both physical and psychological changes, including a rise in sex hormone levels that can affect the composition of oral cavity microbiota.[5] The ages of 12-15 is also the period when all permanent teeth except for the third molar have completely erupted.[6] The changes and developments that occur in adolescents influence their oral health status. Many oral health problems in adolescents, such as dental caries, have been found to be related to oral health knowledge, attitude, and practice.[7]

Many oral health conditions are influenced

by individual behaviors.[8] Health behavior affects the physical, mental, emotional, psychological, as well as spiritual.[9] Health behaviors adopted during adolescence play a key role in shaping an individual's future health status.[10]

Adolescence is a period marked by physical and psychological changes that significantly influence health behaviors. By the age of 13, most adolescents have developed all their permanent teeth except the third molars. Oral health behavior during this stage is also closely linked to family socioeconomic status.[8,11-12]

Family socioeconomic status —which includes factors such as education, income, and occupation— has been shown to influence adolescents' oral health outcomes. Education plays a key role, as it is closely tied to employment opportunities and income levels; generally, higher educational attainment leads to better jobs and higher earnings, which in turn contribute to improved health outcomes.[12-13] This study aimed to analyze the socioeconomic factors related to oral health knowledge, attitude, and practice among adolescents in Jember, Indonesia.

## MATERIALS AND METHODS

### Study Design
This study is a cross-sectional study among the population of junior secondary school students to determine factors related to oral health knowledge, attitude, and practice among adolescents.

### Setting
This study was conducted in Jember Regency, which is in East Java province, Indonesia, in September-November 2023. Jember had a population of around 2.5 million people, with 442,522 adolescents aged 10-19 years.[14]

### Participants
The population in this study was all junior high school students in Jember Regency who were registered in the Basic Education Data (Dapodik) 2023, totaling 68,367 students.[15] The sample size was determined using the Slovin formula, with a minimum sample size of 398 students (N=68,367; e=0.05). The sample was obtained using a cluster random sampling.

As a step of the cluster sampling process, the Jember Regency was divided into three areas: North, Middle, and South. Schools as sampling units were selected randomly from each area. One private and one public school were obtained from the North and South areas. Due to the density of the middle area population, two public and two private schools were randomly selected. In total, 398 students from eight schools were involved in this study.

### Ethical Approval and Informed Consent
Ethical approval was obtained from the Health Research Ethics Commission Faculty of Dentistry, University of Jember (2247/UN25.8/KEPK/DL/2023).
The aim and methodology were explained to the students and teachers. Written informed consent was obtained from the students prior to the study.

### Variables
There were three dependent variables in this study, namely oral health knowledge, oral health attitudes, and oral health practices. The oral health knowledge variable assesses students' knowledge of toothbrushing, healthy food, and dental visits. The attitudes toward toothbrushing habits, dental visits,

and consuming sweet food were questioned in this study. The questions on oral health practice were mainly about toothbrushing, eating habits, oral health-seeking behavior, and smoking.

The independent variables of this study are gender, school, ethnicity, mother and father education, mother and father employment, monthly income, and number of children in the family. Data for these independent variables were collected from the school's parental database and questionnaires given to the students. The trial questionnaire was conducted on 38 participants to assess its validity and reliability.

## Statistical Analysis

Data were entered in the SPSS [25] spreadsheet and analyzed using descriptive statistics for responses to oral health knowledge, attitudes, and practice questions. Univariate analysis The Spearman rank test was conducted for every dependent variable in this study.

Significant independent variables were then entered into a multiple regression model to determine factors associated with oral health, oral health knowledge, attitudes, and practice; $p<0.05$ was considered statistically significant for all the tests.

## RESULTS

Table 1 presents the characteristics of respondents in this study. There were 398 study participants, 196 (49.2%) males and 202 (50.8%) females. Most of the study participants were 13 years old (45%). About 61.3% of participants in this study are students at a public school.

The majority of the participants' ethnicity is Javanese (63.1%). The participants' mothers' and fathers' education are dominated by secondary education.

Most mothers were housewives (64.1%), and the highest percentage of fathers' employment were farmers and others (41.7%). The participants' parents' monthly income was dominated by low (less than IDR 1,500,000), which is 65.1%. The number of children in the participants' families was dominated by 1-2 children (55.5%). Descriptive statistics regarding participants' oral health knowledge, attitude, and practice are shown in Table 2.

The adolescent knowledge result showed that most participants knew that the optimal time-point of tooth brushing is after breakfast and before sleep at night (63.1%). Herbs provide the most answers (61.3%) to the components of toothpaste to prevent cavities. Also, 316 participants knew vegetables were good food for dental health.

Around 83.9% of participants knew the toothbrush had to be replaced every three months. Regarding knowledge, the highest proportion of adolescents sought dental care solely in response to toothache (44.7%). In terms of oral health attitude, the majority of the students (65.1%) did not agree with the statement of brushing their teeth while showering, and only 13 students (3.3%) strongly agree with that statement.

More than half of the respondents, (n= 224 students; 56.3%), agreed with the statement of not going to the dentist because of fear. A total of 253 students (63.6%) agreed to have their teeth filled by a dentist if they experienced cavities. Half of the participants

(50.8%) agreed that sweet and sticky foods can induce cavities, while only 24 participants (6%) disagreed. Furthermore, 243 participants (61.1%) agreed with feeling anxious if there were problems with their teeth and mouth, and 18 participants (4.5%) disagreed with feeling anxious about problems with their teeth and mouth.

Regarding oral health practice, 172 students (43.2%) brush their teeth when bathing in the morning and evening. The act of consuming sweet and sticky food among participants was dominated by the answer of consuming two to three times a day (159 students, 39.9%). The highest percentage of participants (40.2%) reported seeing the dentist for treatment when they had a toothache. When brushing their teeth, almost all participants (93.2%) reported brushing the entire surface of their teeth. This study found 11.8% of the participants (47 students) were smoking either daily or 1-2 times a week.

**Table 1.**
Socioeconomic Characteristics of the Study Participants (N=398)

| Variable | | Number (N) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 196 | 49.2 |
| | Female | 202 | 50.8 |
| Age | 12 years | 23 | 5.8 |
| | 13 years | 179 | 45.0 |
| | 14 years | 155 | 38.9 |
| | 15 years | 34 | 8.5 |
| | 16 years | 17 | 1.8 |
| School | Public | 244 | 61.3 |
| | Private | 254 | 38.7 |
| Ethnicity | Javanese | 251 | 63.1 |
| | Madurese | 142 | 35.7 |
| | Others | 5 | 1.3 |
| Mothers' Education | Primary Education or Less | 168 | 42.2 |
| | Secondary Education | 196 | 49.2 |
| | Higher Education | 34 | 8.5 |
| Fathers' Education | Primary Education or Less | 163 | 41.0 |
| | Secondary Education | 207 | 52.0 |
| | Higher Education | 28 | 7.0 |
| Mothers' Employment | Housewife | 255 | 64.1 |
| | Self-employed | 56 | 14.1 |
| | Employee | 39 | 9.8 |
| | Others (Farmers) | 48 | 12.1 |
| Fathers' Education | Unemployed | 18 | 4.5 |
| | Self-employed | 139 | 34.9 |
| | Employee | 75 | 18.8 |
| | Others (Farmers) | 166 | 41.7 |
| Monthly Income (IDR) (Indonesian rupiah) | Low (<1,500,000) | 259 | 65.1 |
| | Middle (1,500,000-2,500,000) | 120 | 30.2 |
| | High (>2,500,0000) | 19 | 4.8 |
| Number of Children | 1-2 | 221 | 55.5 |
| | 3-4 | 159 | 39.9 |
| | 5 + | 18 | 4.5 |

**Table 2.**

Oral Health Knowledge, Attitude, and Practice among the Study Participants (N=398)

|  | Questions | (N) | (%) |
|---|---|---|---|
| **Knowledge** | | | |
| Optimal time for tooth brushing | After breakfast and before going to bed at night | 251 | 63.1 |
|  | After showering in the morning before breakfast | 33 | 8.3 |
|  | Every shower | 114 | 28.6 |
| Toothpaste ingredients to prevent cavities | Fluoride | 106 | 26.6 |
|  | Herbs | 244 | 61.3 |
|  | Menthol | 48 | 12.1 |
| Foods that are good for dental health | Rice | 78 | 19.6 |
|  | Chocolate | 4 | 1.0 |
|  | Vegetables | 316 | 79.4 |
| The ideal time to replace your toothbrush | No later than once every 3 months | 334 | 83.9 |
|  | No later than once every 4 months | 48 | 12.1 |
|  | No later than once every 6 months | 16 | 4.0 |
| The right time to visit the dentist | Only if there is a toothache | 178 | 44.7 |
|  | Regularly at least once a year | 97 | 24.4 |
|  | Regularly at least twice a year | 123 | 30.9 |
| **Attitude** | | | |
| I prefer to brush my teeth while showering because it's more practical | Strongly agree | 13 | 3.3 |
|  | Agree | 51 | 12.8 |
|  | Disagree | 259 | 65.1 |
|  | Strongly disagree | 75 | 18.8 |
| I don't go to the dentist because I'm afraid | Strongly agree | 92 | 23.1 |
|  | Agree | 224 | 56.3 |
|  | Disagree | 66 | 16.6 |
|  | Strongly disagree | 16 | 4.0 |
| I want to go to the dentist to have my teeth filled if my teeth have cavities | Strongly agree | 64 | 16.0 |
|  | Agree | 253 | 63.6 |
|  | Disagree | 58 | 14.6 |
|  | Strongly disagree | 23 | 5.8 |
| In my opinion, eating sweet and sticky foods can cause cavities | Strongly agree | 144 | 36.2 |
|  | Agree | 202 | 50.8 |
|  | Disagree | 24 | 6.0 |
|  | Strongly disagree | 28 | 7.0 |
| I feel worried/anxious if there are problems/pain in my teeth and mouth | Strongly agree | 105 | 26.4 |
|  | Agree | 243 | 61.1 |
|  | Disagree | 32 | 8.0 |
|  | Strongly disagree | 18 | 4.5 |
| **Practice** | | | |
| Optimal time-point of tooth brushing | After waking up and when taking a shower in the afternoon | 68 | 17.1 |
|  | Shower in the morning and evening | 172 | 43.2 |
|  | After breakfast and before bed at night | 158 | 39.7 |
| Frequency of consuming sticky and sweet foods | Rarely almost never | 150 | 37.7 |
|  | 2-3 times a day | 159 | 39.9 |
|  | 3 times a day | 89 | 22.4 |
| What to do when you have a toothache | I just let it be | 32 | 8.0 |
|  | Buying medicine at a shop/pharmacy | 127 | 32.0 |
|  | Go to the dentist for treatment | 160 | 40.2 |
|  | Never had a toothache | 79 | 19.8 |
| How to brush your teeth | Brushing the front teeth only | 11 | 2.8 |
|  | Brushing all surfaces of teeth | 371 | 93.2 |
|  | Brushing teeth within easy reach | 16 | 4.0 |
|  | Go to the dentist for treatment | 160 | 40.2 |
| The act of smoking | Smoking daily | 15 | 3.8 |
|  | Smoking 1 or 2 times a week | 32 | 8.0 |
|  | Never smoked | 351 | 88.2 |

**Table 3.**
Univariate and Multivariate Analysis of Factors Related Oral Health Knowledge

| Variable | Univariate | Multivariate | | | |
|---|---|---|---|---|---|
| | | *p*<0.05 | B | 95% CI for B | *p*<0.05 |
| Gender | Male* | 0.000 * | | | |
| | Female | | 0.316 | 0.112, -0.520 | 0.003* |
| School | Public* | 0.000* | | | |
| | Private | | -0.386 | -0.596, -0.175 | 0.000* |
| Ethnicity | Javanese* | 0.001* | | | |
| | Maduranese | | -0.253 | -0.479, -0.028 | 0.028* |
| | Others | | -1.087 | -2.018, -0.156 | 0.022* |
| Mothers' Education | Primary education or less* | 0.025* | | | |
| | Secondary education | | 0.064 | -0.212, 0.340 | 0.649 |
| | Higher education | | 0.303 | -0.172, 0.777 | 0.211 |
| Fathers' Education | Primary education or less* | 0.016* | | | |
| | Secondary education | | 0.079 | -0.197, 0.354 | 0.575 |
| | Higher education | | 0.037 | -0.46, 0.543 | 0.886 |
| | Mothers' Employment | 0.210 | | | |
| | Fathers' Employment | 0.443 | | | |
| | Monthly Income (IDR) | 0.402 | | | |
| | Number of Children | 0.381 | | | |

**\*:** Reference category. **CI:** Confidence interval. **B:** Prediction probability

**Table 4.**
Univariate and Multivariate Analysis of Factors Related Oral Health Attitudes

| Variable | Univariate | Multivariate | | | |
|---|---|---|---|---|---|
| | | *p*<0.05 | B | 95% CI for B | *p*<0.05 |
| Gender | Male* | 0.014* | | | |
| | Female | | 0.440 | 0.084 – 0.796 | 0.016* |
| School | | 0.968 | | | |
| Ethnicity | | 0.814 | | | |
| Mothers' Education | | 0.000* | | | |
| | Primary education or less* | | 0.745 | 0.371 – 1.118 | 0.000* |
| | Secondary education | | 1.263 | 0.596 – 1.930 | 0.000* |
| Fathers' Education | | 0.234 | | | |
| Mothers' Employment | | 0.788 | | | |
| Fathers' Employment | | 0.826 | | | |
| Monthly Income (IDR) | | 0.107 | | | |
| Number of Children | | 0.860 | | | |

**\*:** Reference category. **CI:** Confidence interval. **B:** Prediction probability

**Table 5.**
Univariate and Multivariate Analysis of Factors Related Oral Health Attitudes

| Variable | Univariate |
|---|---|
| Gender | 0.084 |
| School | 0.070 |
| Ethnicity | 0.052 |
| Mothers' Education | 0.817 |
| Fathers' Education | 0.442 |
| Mothers' Employment | 0.376 |
| Fathers' Employment | 0.430 |
| Monthly Income (IDR) | 0.731 |
| Number of Children | 0.158 |

**\*:** Reference category. **CI:** Confidence interval. **B:** Prediction probability

Table 3 shows univariate and multivariate analyses of factors influencing oral health knowledge.

Multiple regression results showed that gender, school type, and ethnicity were significantly associated with oral health knowledge ($p<0.05$). Females are significantly associated with higher knowledge than males ($p=0.003$). School type had the strongest association with oral health knowledge ($p=0.000$).

Participants from public schools were associated with higher knowledge than those from private schools. Javanese ethnicity was significantly associated with higher knowledge than Maduranese ($p=0.028$) and other ethnic backgrounds (v=0.022).

The association of socioeconomic factors and oral health attitudes is presented in Table 4. Multiple regression analysis resulted in a significant association between gender, mother education, and oral health attitude. Females were significantly associated with better attitudes than males ($p=0.016$).

Students with a mother with education higher than elementary schools were significantly related to a better attitude ($p=0.000$). There was no significant association between socioeconomic factors and oral health practice, as presented in Table 5.

## DISCUSSION

This study examined oral health knowledge, attitude, and practice among adolescents 12-16 years old in eight different junior secondary schools in Jember, Indonesia. The correlation between the socioeconomic characteristics of the respondent and oral health knowledge, attitude, and practice was determined statistically using unilateral Spearman correlation, continued with multiregression analysis. The adolescent oral health knowledge in most of the questions was answered correctly, as seen in Table 2. The exciting part is that most participants answered that herbs are the ingredients of toothpaste to prevent cavities.

This shows that herbs are more popular than fluoride in preventing cavities. This may happen because Indonesia has traditional herbal medicines that have been practiced for centuries in Indonesian society.[16]

Many types of essential ingredients for traditional medicine are widely grown in Indonesia. Participants' knowledge of the ideal visit to the dentist was mostly answered "when they had problems with their teeth".

This showed that the dissemination of the importance of an oral health campaign to visit the dentist regularly, at least every six months, was low. In terms of the attitude toward oral health, most of the adolescents had a good attitude. However, most of the par-ticipants answered "agree" not to visit the dentist because they were afraid. This is in accordance with research conducted by Slabšinskienė et al.,[17] which states that two-thirds of teenagers and children are afraid to visit the dentist.

Regarding oral health practice, the majority of students in this research brush their teeth when taking a bath in the morning and afternoon. This practice was also found in many previous studies in Indonesia among children[18] and parents,[19] in which they mostly performed brushing during the bathing routine and rarely at night before bedtime. This study found that gender, school, ethnicity, and parental education significantly correlate with participants' oral health knowledge.

Gender has a significant relation with oral health knowledge, which is compatible with research conducted by Romano et al.,[20] who stated females have better oral health knowledge and are more interested in their physical appearance.

Schools have a significant relationship with oral health knowledge, where students in public schools have better oral health knowledge than private school students. This may happen because most public schools in Indonesia apply entrance exams using national exam scores. Students who enter school using national exam scores have higher learning achievements than students who enter school using local written exams because the validity of the local written exam is unknown, so the validity of the question is unknown and have an unsatisfactory assessment.[21]

Furthermore, Fenanlampir et al.,[22] states that public school students in Indonesia have higher science competency scores than students in private schools. This shows that students in state schools have better learning abilities, which may affect their oral health knowledge, than students in private schools.

In this study, ethnicity was found to have a significant association with oral health knowledge. The Javanese ethnic group is the most dominant ethnic group in this study. Javanese and Madurese are the most dominant ethnicities in Jember.[23] In this study, Javanese have shown to have better oral health knowledge, which may occur due to several engrained Javanese cultural values including those of cooperation, caring, and responsibility.[24]

Mothers' education showed a significant relation with oral health knowledge in this study. This aligns with research conducted by Chen et al., which states that children from families with a higher level of education have better oral health knowledge.[25]

This study found that gender and mo-thers' education significantly correlate with students' attitudes towards oral health. Gender showed a significant correlation with oral health attitude, which may relate to females having greater oral health

literacy.[26] The previous study also showed an association between mothers' education and children's oral behavior, which was higher than fathers' education.[25]

This study is a cross-sectional study which limits causal inference. The income data was gathered from the school database, which may need to be updated. However, this study was the first conducted among adolescents in Jember, Indonesia, and it can provide data on oral health knowledge, attitude, and practice.

## CONCLUSIONS

Gender, school, and ethnicity were strongly related to adolescent oral health knowledge, whereas gender and mother's education were related to adolescent oral health attitude. Understanding the association between socioeconomic backgrounds is essential in developing effective oral health prevention strategies.

## CONFLICT OF INTERESTS

The authors declare no conflict of interest.

## AUTHORS' CONTRIBUTIONS

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