

# Sociodemographics, oral health literacy, and caries experience related to daily performance among adolescents

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Low health literacy in adolescents can negatively impact their health status and quality of life. **Objective:** This study aims to verify the impact of sociodemographics, caries experience and oral health literacy (OHL) on the quality of life among adolescents aged 11–12. **Methods:** A cross-sectional study with a cluster sampling design was conducted on public elementary schools in a district of Batu City in January 2020. Self-administered questionnaires regarding sociodemographics, OHL, and child-oral impact on daily performance (C-OIDP) were administered to respondents. Caries examinations were performed by three independent examiners using the decayed, missing, and filled teeth (DMF-T) index after informed consent was received. The data was analyzed with a comparative test and logistic regression with a significance level of  $< 0.05$ . **Results:** 346 students followed the study, with a response rate of 92.22%. The majority of parents were not college-educated. 71.1% of respondents were 12 years old, 85.3% had caries, and 55.3% had a high total OHL score. There was a significant difference between low- and high-quality daily performance in the OHL score and caries experience categories ( $p=0.006$  and  $p=0.008$ , respectively). Multivariate analysis showed that the fathers' education, caries experience, and OHL were associated with the quality of daily performance. **Conclusions:** Health literacy, caries experience, and parental education contribute to the quality of adolescents' daily performance. Adolescents with few caries and high OHL have a better quality of daily performance.

**Keywords:** Health literacy. Oral health. Adolescent. Quality of life.

## Introduction

Adolescence is a psychological transition period in which individuals reject received norms and create their own styles and terms<sup>1</sup>. This period is associated with health vulnerabilities due to unjustified behaviour, low of prevention activities and a desire to defy parents<sup>2</sup>. Studies show that adolescents with low oral health literacy (OHL) are more disposed to behaviors and practices that pose an adverse risk to their health, along with improper medical treatment and poor oral hygiene<sup>2</sup>, which can negatively affect oral health. Thus, high OHL may contribute to oral health disparities in the adolescent population<sup>3,4</sup>.

Ratzan and Parker<sup>5</sup> (2000) define health literacy as the degree to which individuals can obtain, process, and understand basic health information and services needed to make appropriate health decisions. Higher health literacy and skills lead to better health knowledge and behaviors and clinical outcomes<sup>6</sup>. Understanding adolescent health literacy is very important because, during adolescence, health behavior that will be present throughout an individual's life is formed. Good literacy skills can help adolescents to find the necessary health information. Adolescents will become independent users of the health system in the future, and adolescents with good health literacy can help to reduce poor health levels caused by low health literacy in adults<sup>7,8</sup>.

Quality of life is described as an individual's perception of their position in life in the context of the culture and value systems in which they live, along with their goals, expectations, standards, and concerns<sup>9</sup>. Rates and determinants of quality of life in adults have been well reported in developed countries. However, studies on the quality of life in developing countries are lacking, especially for children and adolescents<sup>10</sup>. Middle-school age is a necessary transitional period from childhood to maturity that is very important for individuals' physical, psychological, and social adaptation. Throughout these years, adolescents' physical and mental health and quality of life can affect their lives; accordingly, studying quality of life during middle-school age is crucial<sup>10</sup>.

Evidence that links poor health literacy with poor quality of life among patients in medical/clinical settings is growing<sup>11,12</sup>. However, whether health literacy significantly affects the quality of life in student and adolescent populations is rarely reported<sup>10</sup>. In Indonesia, several studies have been conducted on the quality of life health-related to oral health and oral health literacy in adolescents. However, there is a lack of studies that identify the relationship between the two.

The Indonesian OHL and child-oral impact on daily performance (C-OIDP) questionnaire showed valid and reliable properties to be used among 12-15 years old school children in Jakarta, Indonesia<sup>13,14</sup>. Previous studies in Jakarta showed that the prevalence of caries in adolescents aged 12–13 was 73.9%<sup>15</sup>. A review of health literacy in adolescents stated that more research is needed to determine effective evaluations for health literacy in adolescents<sup>6</sup>. This study aimed to determine the impact of caries

experience, OHL, and sociodemographics on quality of daily performance in adolescents aged 11–12 years in Batu City, East Java Province, Indonesia.

## Material and Methods

The study was conducted in January 2020 with a cross-sectional study design. A cluster sampling design was used to select an elementary school in Batu City, one of the districts in the province of East Java, Indonesia. Batu City has four sub-districts. Four public elementary schools were randomly selected in each district, and one grade-six class was randomly selected as a sample in each school because there were three to four classes in each school.

All the students in the class were recruited as respondents. The estimated sample size was calculated using G\*Power 3.1.9.4 with a statistical t-test. Based on a significance level of 5%, a statistical power of 95%, and an estimated effect size of 0.41 (assuming the average difference is considered significant between low and high quality-of-life scores), 326 participants were required. Allowing for a 10% attrition rate, 358 participants had to be recruited. A cross-sectional survey was conducted by recruiting 375 students from selected sixth-grade classes. The study was approved by the Ethics Committee of the State Polytechnic of Health, Malang-Indonesia, No.:538/KEPK-POLKESMA/2019. Written informed consent was obtained from the caregivers/parents before continuing the study protocol.

## Measures

Two self-administrated questionnaires were used in this study: a questionnaire that was adapted to Indonesian OHL and C-OIDP<sup>13,14</sup> and socio-demography questions such as age, gender, and parental education. The age categories were 11 and 12 years old, the parents' educational categories were college and non-college, and caries experience categories were caries and caries-free. An oral examination was performed to collect caries data using the decayed, missing, and filled teeth (DMF-T) index. Caries were evaluated according to oral health surveys from the World Health Organization (WHO)<sup>16</sup>. Three examiners who were not relevant to the data analysis conducted the caries examinations using the DMF-T index. The examiner performed a kappa agreement to ensure reliability with a minimum score of 0.8. The data obtained from the questionnaire were inputted by two coders trained by a dentist with experience in community research for two days.

## Oral Health Literacy

The number of questions used follows the short-form version of the health literacy dental scale, with seven question items that are valid and reliable in the Indonesian version, based on a previous study<sup>13,17</sup>. The OHL questionnaire's questions focused on the difficulties/limitations of obtaining health information, divided into five domains: communication, receptivity, understanding, utilization, and support. The respondents' options used a five-point Likert-type scale ranging from "without difficulty" to "unable to do". The scores were coded from one to five, and the possible final scores ranged from seven to thirty-five. Higher scores indicated preferable OHL. Oral health literacy

was categorized as high and low, with the median as a cut-off point. A total score of less than 34 was categorized as low OHL, and a total score equal to or more than 34 was classified as high OHL.

### Quality of Daily Performance

To measure the respondent's quality of life, or what we named quality of daily performance, the research used C-OIDP, which was valid and reliable in the Indonesian version of the previous study<sup>14</sup>. Child-oral impact on daily performance is a socio-dental health indicator that measures social effects, based on oral conditions that use a theoretical model of oral health conditions. The questionnaire consists of eight questions to assess daily performances (eating, cleaning, speaking, pain, emotion, smiling, school activities, and social)<sup>18</sup>. The questions were administered, and the participants were asked to rate the severity of their oral impact on a four-point Likert scale ("none at all" = 1, "very little" = 2, "pretty much" = 3, and "quite a lot" = 4). A sum was made of the values obtained for the 8 performances, which resulted in a number between 8 and 32. The median was used as the cut-off point to determine the low and high quality of life categories. Respondents with a total score of less than 31 were categorized as having low-quality daily performance. If the total score was equal to or more than 31, they were classified as having a high quality of daily performance.

### Data Analysis

Variables of gender, age, parental education, caries experience, and OHL were analyzed descriptively. All variables were also tested for the mean difference against low and high C-OIDP using the chi-square. Multivariate logistic regression analysis was used to determine whether sex, age, parental education, caries experience, and OHL contributed to C-OIDP. All analyses used a two-sided significance level of 5%.

## Result

Three hundred seventy-five students participated, and 346 completed the questionnaire using Google Forms, so the response rate was 92.22%. Cronbach's alpha of items questionnaire health literacy dental scale and C-OIDP yielded 0.761 and 0.768. The three examiners' agreement was 0.94 for DMF-T by the Kappa test.

Table 1 shows the participants' attributes. The percentage of female participants was 51.2%, and the percentage of male participants was 48.8%. Most of the parents (both fathers and mothers) were not college-educated; 71.1% of the respondents were 12 years old, 85.3% had caries experience, and 55.3% had a high total score of OHL. There were no significant differences regarding gender, age, and the mother's education on quality of life ( $p < 0.05$ ), but there were significant differences regarding the father's education, caries experience, and OHL.

**Table 1.** The difference in sociodemographic, caries experience, and OHL based on the quality of daily performance among adolescents in Batu City, 2020

Variable	n (%)	Quality of daily performance		p-value
		(low) < 31	(high) >=31	
Sex				
Man	177 (51.2)	95 (53.7)	82 (46.3)	0.051
Woman	169 (48.8)	73 (43.2)	96(56.8)	
Age (years)				
11	97 (28.3)	43 (44.3)	54 (55.7)	0.344
12	246 (71.7)	123 (50)	123 (50)	
Father education				
Non-Collage	224 (83.0)	95 (42.4)	129 (57.6)	0.002*
Collage	122 (17.0)	73 (59.8)	49 (40.2)	
Mother education				
Non-Collage	224 (82.7)	101 (45.1)	123 (54.9)	0.081
Collage	122 (17.3)	67 (54.9)	55 (45.1)	
Caries experience				
Free	51 (14.7)	16 (31.4)	35 (68.6)	0.008*
With caries	295 (85.3)	152 (51.5)	143 (48.5)	
Oral health literacy				
Low	155 (44.7)	88 (56.8)	67 (43.2)	0.006*
High	191 (55.3)	80 (41.8)	111 (58.1)	

\*Chi-Square, significant level  $p < 0.05$ 

Table 2 displays the mean total score of OHL of respondents with low and high quality of life, respectively 31.72 and 32.90. Respondents with low and high-quality daily performance scores showed a significant difference ( $p < 0.05$ ) in OHL. Higher OHL was associated with high quality of life. There was a significant difference between respondents with low and high quality of daily performance in the domains of OHL: receptivity, understanding, and one question on utilization. There was no statistical difference in the domains of communication, support, and one question on utilization.

**Table 2.** The mean difference in OHL based on the quality of daily performance among adolescents in Batu City, 2020

Variable	Quality of daily performance		p-value
	(low) < 31	(high)>=31	
	Mean (SD)	Mean (SD)	
Total score oral health literacy (7-35)	31.72 (3.79)	32.90 (3.03)	0.001*
<b>Communication</b>			
Question 1 (1-5)	4.52 (0.85)	4.63 (0.83)	0.113

Continue

Continuation			
<b>Receptivity</b>			
Question 2 (1-5)	4.44 (0.82)	4.75 (0.52)	<0.001*
Question 3 (1-5)	4.45 (0.91)	4.67 (0.62)	0.031*
<b>Understanding</b>			
Question 4 (1-5)	4.47 (0.91)	4.64 (0.83)	0.013*
<b>Utilization</b>			
Question 5 (1-5)	4.63 (0.68)	4.75 (0.55)	0.081
Question 6 (1-5)	4.63 (0.65)	4.76 (0.53)	0.025*
<b>Support</b>			
Question 7 (1-5)	4.55 (0.93)	4.67 (0.81)	0.248

\*Mann-Whitney, significant level  $p < 0.05$

Table 3 follows multivariate logistic analysis performed on the quality of daily performance with independent variables: gender, age, the father's education, the mother's education, caries experience, and OHL. The results showed that the father's education, caries experience, and OHL were associated with a quality of daily performance ( $p < 0.05$ ). Adolescents that have fathers with high education levels have a 2.83 times higher quality of daily performance. Those with caries tend to have a 2.25 times lower quality of daily performance. Adolescents with high OHL have a possibility of a 52% higher quality of daily performance.

**Table 3.** Multivariate logistic regression model of quality of daily performance among adolescents in Batu City, 2020

		p-value	OR	95% CI for Exp(B)	
				Lower	Upper
Sex	Man (ref)				
	Woman	0.128	0.705	0.449	1.106
Age (years)	11 (ref)				
	12	0.786	0.932	0.560	1.551
Father education	Non Collage (ref)				
	Collage	0.007*	2.834	1.329	6.043
Mother education	Non Collage (ref)				
	Collage	0.398	0.723	0.340	1.535
Caries experience	Free (ref)				
	With caries	0.016*	2.255	1.166	4.361
Oral health literacy	Low (ref)				
	High	0.004*	0.520	0.332	0.816

\*Significant  $p < 0.05$

## Discussion

This study showed that adolescents with high OHL scores were higher than those with low OHL. However, cross-tabulation described an association between high OHL scores and high-quality daily performance scores. Adolescents with high OHL have a possibility of a 52% higher quality of daily performance. The consequence of health literacy on health outcomes in a previous study found that students with lower health literacy had a higher risk of obtaining lower quality-of-life scores. In addition, students with low health literacy scores tended to have lower quality-of-life scores than students with more adequate health literacy scores<sup>10,19</sup>. Studies show several reasons adolescents with good health literacy levels have a higher quality of life than those with poor health literacy levels. Adolescents with significant levels of health literacy may be more aware of how to seek health-related information from health professionals, caregivers, teachers, and friends. With solid comprehension of health information, they make the right decisions regarding their health to improve their quality of life. In contrast, those with lower health literacy are limited in obtaining information, communicating with health care providers, understanding and complying with the advice given by health services, and making the right health-related decisions. As such, they require adequate information to make decisions<sup>10,20</sup>.

The prevalence of caries among adolescents was relatively high, with the same result as the previous study<sup>15</sup>. Although not statistically significant, those with lower or marginalized OHL tended to have more caries, and those with caries tend to have a low quality of daily performance. Adolescents with low levels of health literacy are more likely to engage in risky behavior, as well as smoking, excessive alcohol consumption, modest physical activity, and unwholesome food intake, all of which have a significant association with low quality of life<sup>21</sup>. Adolescents with low health literacy levels and poor quality of life will have more material and mental problems<sup>22</sup>. Low OHL levels can hamper prevention- and treatment-seeking efforts<sup>23</sup>. Previous research found that individuals with lower OHL levels reported more significant experience and need for treatment<sup>24</sup>. Students may explain this need to recognize dental and oral health terms so that they only partially understand the information they read<sup>4</sup>.

Although more than half of the respondents had a high literacy score, the caries prevalence rate was also high. The average DMF-T index score was three, for children aged 12 years according to the WHO is in the moderate category<sup>16</sup>. A high health literacy score that is not in line with the oral condition of adolescents may explain why the child's decision to get treatment is very dependent on the parents' decision. The decision of parents to take care of their children's dental health is influenced by their level of education, the economic condition of the family, and the parents' OHL<sup>7</sup>. In this study, most parents were not college-educated, and descriptively, respondents with high C-OIDP scores received more support from their families to visit the dentist. This result could be explained by the fact that parental education affects their OHL, which also has implications for their children's oral health decisions.

The current study showed that the father's education determined the respondents' quality of daily performance. Higher further education levels double the possibility of

having a higher quality of daily performance. The health literacy of parents/caregivers influences the health status of their children, according to one study. Child health literacy and parent/caregiver health literacy have a significant relationship<sup>25,26</sup>. Children can decide to engage in good health behavior based on information from their parents. Our findings showed that the father's education contributed to the respondent's oral health and quality of life, unlike other results, which show that the mother's education plays a role in the adolescent's quality of life<sup>27,28</sup>. The explanation is probably specific to Indonesia; as in other developing countries, the father is the head of the family and makes decisions concerning issues such as health treatment. Studies in Colombia have shown that the father's role in the family exhibits several changes, such as being more effective and engaging in childcare. These roles traditionally belong to mothers<sup>29</sup>. Increasing the father's role can be one solution to implementing a child's oral health programs, such as inviting the father to participate in oral health education activities at school, providing dental health examination reports, and assigning tasks to supervise the children's dental home care.

These findings can be considered in policymaking and the planning of health programs, especially for adolescents, as they are a vulnerable generation with various risk factors, such as destructive behavior, and often reject recommended habits<sup>2,7,30</sup>. Policies to improve adolescent oral health is critical in Indonesia, considering that the prevalence of caries in this study was relatively high. An increase in OHL in adolescents can simultaneously improve two things: quality of life and oral health outcomes. Including OHL in the school curriculum, providing dental health education, regular screening, and dental hygiene practices can improve OHL. Due to adolescents' inability to fully make decisions and their dependence on their parents, along with increasing OHL in adolescents, improved OHL in parents should also be pursued.

The cross-sectional method, which cannot measure the causal relationship between variables due to the simultaneous measurement of exposure and outcome, was a limitation of this study. Dental visit data was not collected as an outcome, which could provide insight into individuals' health literacy. Additionally, parents' literacy and socioeconomic data were not recorded as determinants affecting adolescents' oral health outcomes. The sample in this study was only taken from one region, so it does not describe the condition of adolescents in Indonesia more broadly. Future studies must explore more variables that could play a role and expand the sample population's area. The evidence shows that health literacy significantly affects the quality of life. However, the effects on adolescents' quality of life are rarely reported. This current study shows that the prevalence of caries in adolescents is still high. OHL in adolescents may affect their quality of life and oral health conditions. Adolescents with high quality-of-life scores also had high OHL scores. Adolescents with marginalized OHL tended to have more caries.

The results of this study show that fathers' education, caries experience, and OHL are determinants of adolescents' quality of life. Considering that the prevalence of caries was relatively high, policy to improve OHL in adolescents is essential. Including dental health education in the school curriculum, optimizing school health programs, and including parents in school health programs could be effective solutions.



In conclusion, health literacy, caries experience, and parental education contribute to the quality of life. Adolescents with low caries experience and high OHL had a better quality of daily performance. Adolescents are not yet fully independent; parents still have a significant influence on the decisions they make in their lives, so pediatric dentists must involve parents when providing information to them.

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## Conflict of interest

The authors have no conflict of interest to declare.

## Data availability

Data sets related to this article will be available upon request.

## Author Contribution

**Yuanita Lely Rachmawati:** conceptualization, methodology, formal analysis, writing-original draft prepared. **Dyah Nawang Palupi Pratamawari:** project administration, supervision, writing-review and editing. **Meriya Balbeid:** validation, resources, writing-review and editing. **Viranda Sutanti:** visualization, data curation, software, writing-review and editing. All authors actively participated in two distinct criteria related to authorship.

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