

# Oral Health Problem in Indonesia: An Ecological Analysis

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## Abstract

Oral health problem needs special attention around worldwide, including in Indonesia. This study analyzed factors related to oral health problems, including tooth-brushing behavior, dental visit, and public health centers with many dentists in all provinces in Indonesia. In this study, the ecological approach was carried out using secondary data from the Ministry of Health of the Republic of Indonesia in 2018. Data from 34 provinces in Indonesia regarding tooth brushing behavior, dental visit, and public health centers with a sufficient number of dentists were analyzed against the proportion of oral health problems using cross-tabulation. This study found that the ratio of oral health problems in Indonesia is in the moderate category and tooth brushing behavior, dental visit, and public health centers with many dentists in all provinces. Thus, oral health promotion and prevention through increasing awareness of maintaining oral health and equal distribution of dentists must be carried out to establish healthy community behavior in all provinces in Indonesia.

**Keywords:** Ecological Analysis, Secondary Data, Oral Health, Tooth-brushing, Dental Visit, Dentists.

## Introduction

Oral health is an integral part of general health<sup>1</sup>. Dental caries and other oral health problems can cause pain or discomfort to function in chewing, talking, and smiling activities, affecting the individual's role in daily life<sup>2</sup>. Oral health problems in the world still need special attention.

The Global Burden of Disease, Injuries, and Risk Factors Study in 2015 showed that 3.58 billion people in the world experience oral health diseases<sup>3</sup> a trend largely attributable to an epidemiological transition in many countries from causes affecting children, to non-communicable diseases (NCDs). Dental caries occupies the highest prevalence among other oral and dental diseases. A total of 2.3 billion people experienced decay of their permanent teeth, and 560 million children experienced decay of their primary teeth<sup>4</sup>. The proportion

of oral health problems in Indonesia has increased in the last ten years<sup>5-7</sup>.

Various factors can contribute to the incidence of oral health problems. Individual characteristics are influenced by tooth-brushing habits, consumption of sweet foods, and dental visit<sup>8</sup>. Studies show that excessive consumption of sweet foods is related to the incidence of caries<sup>9,10</sup>. The incidence of caries is also found in individuals who rarely brush their teeth and rarely visit the dentist<sup>11,12</sup>.

In the last 25 years, oral health problems have become a significant public health challenge globally. Due to population growth, the cumulative burden of oral health conditions has increased dramatically. This fact shows that oral health diseases are a challenge for policymakers. A particular program to reduce oral health problems in the community must be done as much as possible to advance public health globally<sup>13</sup>. Therefore, regular surveys need to be carried out so that oral health problems in the community can be monitored regularly. Therefore five levels of prevention approach continue to

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be pursued in Indonesia.

According to these problems, this study was aimed to analyze ecologically factors related to oral health, including tooth-brushing behavior, dental visit, and the public health centers with a sufficient number of dentists in all provinces in Indonesia. The ecological approach was used in this research to provide a trend of Indonesia's oral health situation to become the basis for future policies.

## **Materials and Methods**

### ***Study Design***

The study was designed using an ecological analysis approach. Ecological studies focus on comparisons between groups, not individuals. The data analyzed is aggregate data at a particular group or level. This study uses data at the provincial level. In the ecological analysis, variables can be in aggregate measurement, environmental measurement, or global measurement<sup>14,15</sup>.

### ***Data Source***

The study was conducted using secondary data from the 2018 Indonesia Basic Health Survey Report and the 2018 Indonesia Health Profile. Both reports were officially issued by the Ministry of Health of the Republic of Indonesia. The unit of analysis in this study is the province. All provinces in Indonesia analyzed were 34 provinces.

### ***Data Analysis***

The dependent variable in this study was the proportion of oral health problems in Indonesia in 2018. Meanwhile, the independent variables were analyzed for four variables, as shown in Table 1. The ratio of proper tooth-brushing behavior was defined as the proportion of people who brush the teeth every day at least twice a day, after breakfast and before going to bed at night<sup>7</sup>. The ratio of dental visits was defined as the proportion of people who seek treatment from dentists<sup>7</sup>. The public health centers' rate with a sufficient number of dentists

was defined as the public health center, which has a minimum of one dentist, both in inpatient and outpatient, in urban and rural areas, in remote and very remote areas<sup>16</sup>. Public health center, according to the Regulation of the Minister of Health Number 75/2014, was defined as the public health service that organizes community by prioritizing health promotion and prevention to achieve the highest public health status in its working area<sup>17</sup>.

Data were analyzed by univariate and bivariate analysis. Meanwhile, bivariate analysis was performed using cross-tabulations. The entire analysis process utilizes SPSS 20 software.

### ***Ethical Approval***

The study was conducted by utilizing secondary data from published reports. For this reason, ethical clearance is not required in the implementation of this study.

## **Results and Discussions**

Statistical descriptions of the proportion of oral health problems in Indonesia in 2018 and three related variables are shown in Table 1. The distribution of the ratio of oral health problems as the dependent variable listed in the table has a negative meaning, so the more significant the proportion number indicates the high level of oral health problems. Whereas in the three independent variables of this study, the proportion of proper tooth-brushing behavior, the ratio of dental visits, and the balance of public health centers with a sufficient number of dentists are positive, the greater the proportion shows a good value.

Table 1 shows that the mean proportion of oral health problems from 34 provinces in Indonesia is 59.09%, with the lowest mean of 45% and the highest mean of 73.50%. Based on the 2018 Indonesia Basic Health Survey data, it is known that the lowest standard is from Jambi Province, while the highest norm comes from Central Sulawesi Province<sup>7</sup>.

**Table 1. Statistical Description of Variables Related to Oral Health Problems in Indonesia in 2018**

	The Proportion of Oral Health Problem	The Proportion of Proper Tooth-Brushing Behavior	The Proportion of Dental Visit	The Proportion of Public Health Centers with Sufficient Number of Dentists
N	34	34	34	34
Mean	59.0882	3.7382	12.6500	33.6668
Median	58.8000	3.5500	12.1500	32.3850
Mode	58.80	1.60a	9.50a	0.00a
Std. Deviation	6.03689	2.01284	5.00141	18.26751
Variance	36.444	4.052	25.014	333.702
Range	28.50	7.80	19.10	68.60
Minimum	45.00	1.00	5.10	0.00
Maximum	73.50	8.80	24.20	68.60

Source: The 2018 Indonesian Basic Health Survey and the 2018 Indonesia Health Profile

Table 2 shows the cross-tabulation results of the proportion of oral health problems with the independent variable, the proportion of proper tooth-brushing behavior. It is known that the balance of oral health problems and the ratio of appropriate tooth-brushing action in most provinces in Indonesia are in the moderate

category. This data shows that no region in which tooth-brushing behavior is in a low variety has a high proportion of oral health problems. The data also shows no province in which tooth-brushing behavior is in the high category with a low ratio of oral health problems.

**Table 2. Cross-Tabulation Results Proportion of Oral Health Problems and The Proportion of Proper Tooth-Brushing Behavior in Indonesia in 2018**

The Proportion of Proper Tooth-Brushing Behavior	The Proportion of Oral Health Problem					
	Low (45.00% – 53.04%)		Moderate (53.05% – 65.12%)		High (65.13% – 73.50%)	
	n	%	n	%	n	%
Low (1.00% – 1.72%)	2	50	5	20.8	0	0
Moderate (1.73% – 5.74%)	2	50	17	70.8	4	66.7
High (5.75% – 8.80%)	0	0	2	8.3	2	33.3
Total	4	100	24	100	6	100

Source: The 2018 Indonesian Basic Health Survey

Proper tooth-brushing behavior is defined as the habit of brushing the teeth every day at least twice a day, after breakfast and before going to bed at night.<sup>7</sup> Based on these findings, this study shows that most provinces in Indonesia that have a moderate proportion of oral health problems and the ratio of proper tooth-brushing behavior are also in the medium category. Meta-analysis studies show that brushing teeth is individual behavior that can determine the risk of experiencing dental and mouth disease<sup>11</sup>.

This study's findings also show that proper tooth-brushing behavior is not the only factor that determines the proportion of oral problems in a province in Indonesia. Thus, it is necessary to know aspects related to oral health problems in every region in Indonesia. The previous study stated that other individual factors that need to be considered are awareness and motivation for oral health, socioeconomic status, and diet<sup>11</sup>.

Table 3 shows the cross-tabulation results of the proportion of oral health problems with the independent variable of dental visits ratio. It is known that most provinces in Indonesia have a rate of oral health problems. The proportions of the dental visit in most regions in Indonesia are in the moderate category. This data shows that there is one province where the ratio of oral health problems is high, but the percentage of dental visits is still low.

This study shows that the proportion of dental visits is in line with the balance of oral health problems in most Indonesian provinces. The previous research stated that individuals who have oral health problems tend to seek treatment at a dentist to overcome the issues they are experiencing<sup>18,19</sup>Saudi Arabia. METHODS The

present cross sectional study included geriatric patients of 60 years and above, who visited the College of Dentistry, Al-Jouf University. A simple pre-structured questionnaire was filled by the patients, which comprised of demographic details and the different oral complaints of elderly and the type of health care utilized for those complaints. RESULTS Out of total 892 elderly persons included, 51.79% were males and 48.21 were females. The most common oral problem was missing tooth (78.69%. In contrast to other studies in Spain, most of the reasons for a dental visit are routine dental examinations<sup>20</sup>identify the type of treatment received, and analyze the socioeconomic and demographic variables which are associated with dental problems and non-regular utilization of dental services, based on data from the 2017 National Health Survey in Spain. The sample consisted of 4568 children aged between 3 and 14 years old. Utilization of dental services and dental problems were assessed against socioeconomic and demographic characteristics using logistic regression models. The prevalence of caries in Spanish children was 9.29% compared with 18.58% ( $p < 0.001$ ).

Table 4 shows the results of the cross-tabulation of the proportion of oral health problems with the independent variable of the ratio of public health centers with a sufficient number of dentists. It is found that the proportion of oral health problems and public health centers with an adequate number of dentists in most provinces in Indonesia are in the moderate category. The data also shows that two areas are in the variety of the high proportion of oral health problems that do not yet have sufficient dentists to serve treatment at the public health center.

**Table 3. Cross-Tabulation Results of the Proportion of Oral Health Problems and the Proportion of Dental Visit in Indonesia in 2018**

The Proportion of Dental Visit	The proportion of Oral Health Problem					
	Low (45.00% – 53.04%)		Moderate (53.05% – 65.12%)		High (65.13% – 73.50%)	
	n	%	n	%	n	%
Low (5.10% – 7.64%)	1	25	4	16.7	1	16.7
Moderate (7.65% – 17.64%)	3	75	16	66.7	4	66.7
High (17.65% – 24.20%)	0	0	4	1.7	1	16.7
Total	4	100	24	100	6	100

Source: The 2018 Indonesian Basic Health Survey

**Table 4. Cross-Tabulation Results Proportion of Oral Health Problems and Public Health Centers with Sufficient Number of Dentists in Indonesia in 2018**

The Proportion of Public Health Centers with Sufficient Number of Dentists	The Proportion of Oral Health Problem					
	Low (45.00% – 53.04%)		Moderate (53.05% – 65.12%)		High (65.13% – 73.50%)	
	n	%	n	%	n	%
Low (0.00% – 15.39%)	1	25	4	16.7	2	33.3
Moderate (15.40% – 51.92%)	3	75	14	58.3	3	50
High (51.93% – 68.60%)	0	0	6	25	1	16.7
Total	4	100	24	100	6	100

Source: The 2018 Indonesian Basic Health Survey and the 2018 Indonesia Health Profile

The public health centers with a sufficient number of dentists to provide services is defined as a minimum of one dentist, both in inpatient and outpatient, in urban and rural areas, in remote and very remote areas<sup>16</sup>. This study’s findings show that provinces where the proportion of oral health problems is in the moderate category already have a public health center with a sufficient number of dentists to provide services. This

finding is supported by previous research that states that population growth is a challenge for health care facilities in providing care for individuals seeking oral health services<sup>21</sup>.

This study also shows that there are provinces in the category of the high proportion of oral health problems but do not yet have sufficient dentists to serve treatment

at the public health center. This incident can occur due to the inequality of practicing dentists in Indonesia. However, to overcome this, the Ministry of Health of the Republic of Indonesia is recruiting dentists to mobilize and regulate temporary employees and civil servants. Regulate temporary employees are compelled to meet health workers' needs in remote and very remote areas that existing civil servants cannot meet<sup>22</sup>. However, this program must be continuously evaluated. The situation also happened in Australia in 2018. Even though that year the number of dentists increased, the number of registered dentists has not been able to keep up with population growth. The number of dentists who practice in remote, remote, and very remote areas is still not sufficient<sup>23</sup>.

This study analyzed oral health problems with an ecological approach using provincial aggregate data in Indonesia. Thus, further research still needs to be done to investigate other possible factors related to the proportion of oral health problems in each province in Indonesia.

### Conclusions

The study indicates that the proportion of oral health problems in Indonesia is in the moderate category. The finding is in line with the ratio of proper tooth-brushing behavior, the dental visit, and the proportion of public health centers with a sufficient number of dentists in all provinces in Indonesia, which are also in the moderate category. Oral health promotion and prevention through increasing awareness of maintaining oral health and equal distribution of dentists must be carried out to establish healthy community behavior in all provinces in Indonesia.

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**Ethical Clearance:** The study was conducted by utilizing secondary data from published reports. For this reason, the study not required ethical clearance in the implementation.

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