

# Factors Related to Dental and Oral Utilization in Indonesia: An Ecological Study

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## Abstract

Oral and dental health is an integral part of general health which requires attention. This study was conducted to analyze the ecological factors associated with the proportion of dental and oral utilization in Indonesia. The ecological analysis was conducted using secondary data from the Ministry of Health of the Republic of Indonesia report in 2018. All provinces were taken as samples. Apart from the proportion of dental and oral utilization, 5 other variables analyzed as independent variables were a percentage of 9-year gross enrollment rate, percentage of poor people, the proportion of damaged/cavity/sore teeth, proportion of missing teeth due to extraction/date itself, and ratio of PHC per district. The results show that 4 variables tend to have a positive relationship with the proportion of dental and oral utilization. The four variables were the percentage of 9-year gross enrollment rate, the proportion of damaged/cavity/sore teeth, proportion of missing teeth due to extraction/date itself, and the ratio of PHC per district. On the other side, 1 variable was found to tend to have a negative relationship with the proportion of dental and oral utilization, namely the percentage of poor people. It could be concluded that the five independent variables analyzed tend to have a relationship with the proportion of dental and oral utilization in Indonesia.

**Keywords:** dental health, oral health, ecological study, dental health services.

## Background

According to The Global Burden of Disease Study 2016, dental and oral health problems, especially dental caries, are a disease that affects nearly half of the world's population (3.58 billion people). Gum disease (periodontal) is the 11<sup>th</sup> most common disease in the world. Meanwhile, in the Asia Pacific, oral cancer is the 3<sup>rd</sup> most common type of cancer<sup>1</sup>.

Indonesia is a country with a sizeable population. Based on population data for 2018, the total population of Indonesia is 265,377,461 people. Health problems in a country with such a large population, of course, require attention and good health service management<sup>2</sup>. Oral and

dental health which is an integral part of public health certainly needs attention. Based on the 2018 Indonesia Basic Health Survey report, 57.6% of Indonesia's population experiences dental and oral health problems, and of that number, only 10.2% receive treatment or treatment from dental medical personnel<sup>3</sup>. The most common dental health problem is dental caries, around 45.3%. Meanwhile, the population whose teeth were lost due to being pulled out/self-dated was 19.0%<sup>3</sup>.

The adequacy standard for dentists in Public Health Centers (PHC) based on the Minister of Health Regulation Number 75 of 2014 is a minimum of one person per PHC. In 2018, nationally there were 42.46% PHCs from a total of 9,825 PHCs with sufficient dentists. Approximately 13.18% of PHC had the number of dentists exceeding the standard, and 44.36% of PHC had a shortage of dentists<sup>4</sup>.

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The government has a Caries-Free Indonesia program in 2030. The Ministry of Health establishes a Dental and Oral Health Committee through the Minister of Health Decree Number 189 of 2019 concerning the Committee for Dental and Oral Health. This committee has the duties of assisting the Ministry of Health in formulating strategic plans and action plans, conducting advocacy with other stakeholders, conducting monitoring and evaluation, and providing recommendations for solving problems related to the implementation of dental and oral health efforts<sup>5</sup>. It takes serious efforts to realize these ideals. For this reason, it is necessary to have an adequate understanding of what factors are related to the utilization of dental and oral health services in Indonesia. Based on the background description, this study was conducted to analyze the ecological factors associated with the proportion of dental and oral utilization in Indonesia.

### **Materials and Methods**

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 certain group or level, which in this study is the provincial level. Variables in ecological analysis can be in the form of aggregate measurement, environmental measurement, or global measurement<sup>6,7</sup>.

This research using report data taken from the 2018 Indonesia Basic Health Survey and the 2018 Indonesia Health Profile which is an official report released by the Indonesian Ministry of Health. Both reports can be downloaded on the page <http://www.depkes.go.id>. The unit of analysis in this study is the province. A total of 34 provinces in Indonesia were used in the analysis of this study.

The dependent variable in this study was the proportion of dental and oral utilization. Meanwhile, the

independent variables analyzed were the percentage of 9-year gross enrollment rate, percentage of poor people, the proportion of damaged/cavity/sore teeth, proportion of missing teeth due to extraction/date itself, and ratio of PHC.

The percentage of dental and oral utilization is the percentage of residents who receive treatment from dental medical personnel. The percentage of the 9-year gross enrollment rate is the percentage of the enrollment rate which is one indicator to measure the school participation rate of the population according to school-age groups or certain levels of education. This study using a 9-year education level. The percentage of poor people is the percentage of the population with a per capita monthly expenditure level less than or below the poverty line.

The proportion of damaged/cavity/sore teeth is the percentage of residents with permanently damaged cavities in the hard surface area of the teeth that develop from small holes to cavities that damage the teeth. The proportion of missing teeth due to extraction/date itself is the percentage of residents with the loss of teeth from the oral cavity intentionally or unintentionally. The PHC ratio is the PHC ratio per district.

Data were analyzed bivariate by using cross-tabulation to see the trend. The entire analysis process utilizes SPSS 21 software.

### **Results and Discussion**

Table 1 shows the descriptive statistics of the 6 variables analyzed in this study. The highest proportion of the population utilizing dental and oral health services is the Provinces of Jakarta and Yogyakarta (16.4%), while the lowest is East Nusa Tenggara (5.1%). Other variables that have a fairly high variation in values are the 9-year gross enrollment rate and the variable proportion of damaged/cavity/sore teeth.

**Table 1. Descriptive statistic all variables**

	The proportion of dental and oral utilization	Percentage of 9-year gross enrollment Rate	Percentage of poor people	Proportion of damaged/ cavity/ sore teeth	The proportion of missing teeth due to extraction /date itself	The ratio of PHC per district
N	34	34	34	34	34	34
Mean	9.9324	90.9932	10.6535	47.1265	19.5882	1.5456
Median	9.3500	91.4050	8.9050	46.4000	19.6000	1.3700
Std. Deviation	3.27171	4.92008	5.67818	5.73259	2.59402	1.04999
Range	11.30	22.78	23.88	23.90	11.60	6.57
Minimum	5.10	80.17	3.55	36.50	13.00	0.73
Maksimum	16.40	102.95	27.43	60.40	24.60	7.30

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

**Table 2. Cross-tabulation of the proportion of dental and oral utilization and percentage of 9-year gross enrollment rate in Indonesia, in 2018**

Percentage of 9-year gross enrollment rate	The proportion of dental and oral utilization					
	Low (5.10-8.16)		Middle (8.17-10.70)		High (10.71-16.40)	
	N	%	N	%	N	%
Low (80.17-88.49)	4	36.4	4	33.3	3	27.3
Middle (88.50-93.19)	4	36.4	5	41.7	3	27.3
High (93.20-102.95)	3	27.3	3	25.0	5	45.5
Total	11	100	12	100	11	100

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

Table 2 shows the results of the cross-tabulation proportion of dental and oral utilization and the percentage of the 9-year gross enrollment rate. It can be seen that based on the proportion of dental and oral utilization in the high category, the percentage of 9-year

gross enrollment rate for the low category has a lower percentage (27.3%) than the percentage of 9-year gross enrollment rate for the high category (45.5%). This information shows a trend towards a positive relationship between the proportion of dental and oral utilization with

the percentage of the 9-year gross enrollment rate. The higher the percentage of the 9-year gross enrollment rate, the higher the proportion of dental and oral utilization.

The results of the analysis shown in Table 2 are in line with several previous studies that have informed

a positive relationship between education and service utilization<sup>8,9</sup>. Better education levels are often found to be a positive determinant of program performance in the health sector<sup>10,11</sup>. Meanwhile, poor education is often identified as a barrier to achieving better health performance<sup>12,13</sup>.

**Table 3. Cross-tabulation of the proportion of dental and oral utilization and percentage of poor people in Indonesia, in 2018**

Percentage of poor people	The proportion of dental and oral utilization					
	Low (5.10-8.16)		Middle (5.10-8.16)		High (5.10-8.16)	
	N	%	N	%	N	%
Low (3.55-7.21)	2	18.2	3	25.0	7	63.6
Middle (7.22-12.14)	2	18.2	6	50.0	3	27.3
High (12.15-27.43)	7	63.6	3	25.0	1	9.1
Total	11	100	12	100	11	100

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

Table 3 shows the results of the cross-tabulation, proportion of dental and oral utilization, and percentage of poor people. It can be seen that based on the proportion of dental and oral utilization in the high category, the percentage of poor people in the low category has a higher percentage (63.6%) than the percentage of poor people in the high category (9.1%). This information

shows a trend towards a negative relationship between the proportion of dental and oral utilization with the percentage of poor people. The higher the percentage of poor people, the lower the proportion of dental and oral utilization. In contrast to education, poverty is reported to tend to have a negative relationship with performance in the health sector<sup>14</sup>. The poorer, the harder it is to achieve a good performance in the health sector<sup>15,16</sup>.

**Table 4. Cross-tabulation of the proportion of dental and oral utilization and proportion of damaged/cavity/sore teeth in Indonesia, in 2018**

The proportion of damaged/cavity/sore teeth	The proportion of dental and oral utilization					
	Low (5.10-8.16)		Middle (5.10-8.16)		High (5.10-8.16)	
	N	%	N	%	N	%
Low (36.50-43.90)	4	36.4	6	50.0	2	18.2
Middle (43.91-48.16)	4	36.4	1	8.3	6	54.5
High (48.17-60.40)	3	27.3	5	41.7	3	27.3
Total	11	100	12	100	11	100

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

Table 4 shows the results of the cross-tabulation, the proportion of dental and oral utilization, and the proportion of damaged/cavity/sore teeth. It can be seen that based on the proportion of dental and oral utilization

in the high category, the proportion of damaged/cavity/sore teeth in the low category had a lower percentage (18.2%) than the proportion of damaged/cavity/sore teeth in the high category (27.3%). This information shows a trend towards a positive relationship between the proportion of dental and oral utilization with the proportion of damaged/cavity/sore teeth.

**Table 5. Cross-tabulation of the proportion of dental and oral utilization and proportion of missing teeth due to extraction/date itself in Indonesia, in 2018**

The proportion of missing teeth due to extraction/date itself	The proportion of dental and oral utilization					
	Low (5.10-8.16)		Middle (5.10-8.16)		High (5.10-8.16)	
	N	%	N	%	N	%
Low (13.00-18.13)	5	45.2	4	33.3	2	18.2
Middle (18.14-19.93)	2	18.2	4	33.3	6	54.5
High (19.94-24.60)	4	36.4	4	33.3	3	27.3
Total	11	100	12	100	11	100

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

Table 5 shows the results of the cross-tabulation, the proportion of dental and oral utilization, and the proportion of missing teeth due to extraction/date itself. It can be seen that based on the proportion of dental and oral utilization in the high category, the proportion of missing teeth due to extraction/date itself in the low category has a lower percentage (18.2%) than the proportion of missing teeth due to extraction/date itself in the high category (27.3%). This information shows a trend towards a positive relationship between the proportion of dental and oral utilization with the

proportion of missing teeth due to extraction/date itself. The higher the proportion of missing teeth due to extraction/date itself, the higher the proportion of dental and oral utilization.

The information presented in Table 4 and Table 5 shows a positive relationship between need and demand. This situation confirms the positive relationship between need and demand. The higher the perceived need, the higher the demand<sup>17,18</sup>.

**Table 6. Cross-tabulation of the proportion of dental and oral utilization and the ratio of PHC per district in Indonesia, in 2018**

The ratio of PHC per district	The proportion of dental and oral utilization					
	Low (5.10-8.16)		Middle (5.10-8.16)		High (5.10-8.16)	
	N	%	N	%	N	%
Low (0.73-1.30)	4	36.4	5	41.7	2	18.2
Middle (1.31-1.45)	5	45.5	6	50.0	1	9.1
High (1.46-7.30)	2	18.2	1	8.3	8	72.7
Total	111	100	12	100	11	100

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

Table 6 shows the results of the cross-tabulation, the proportion of dental and oral utilization, and the ratio of PHC per district. It can be seen that based on the proportion of dental and oral utilization in the high category, the ratio of PHC per district in the low category has a lower percentage (18.2%) than the ratio of PHC per district in the high category (72.7%). This information shows a trend towards a positive relationship between the proportion of dental and oral utilization with the ratio of PHC per district. The higher the ratio of PHC per district, the higher the proportion of dental and oral utilization. The results of this study indicate that the availability of service facilities (ratio of PHC per district) can encourage the utilization of dental and oral health services in Indonesia. More service facilities are available, making it easier for people who need to access them. Conversely, minimal availability is a barrier to access to health services<sup>19</sup>.

### Conclusions

It could be concluded that the 5 variables analyzed tend to have a relationship with the proportion of dental and oral utilization in Indonesia. The five variables are the percentage of 9-year gross enrollment rate, percentage of poor people, the proportion of damaged/cavity/sore teeth, proportion of missing teeth due to extraction/date itself, and ratio of PHC per district.

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**Ethical Clearance:** 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.

**Conflicting Interests:** Nil

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