



## Research Article

# The Correlation of Oral Health Knowledge and Affective with Caries Rate in Rural Communities

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## Abstract

The results of Riskesdas (Baseline Health Research) by the Indonesian Ministry of Health in 2018 revealed that the caries rate in rural areas was higher than in urban areas. However, the number of villagers receiving dental and oral health care was lower than in urban communities. Karangtengah Village was located in the Baturraden District, Banyumas Regency, which is socio-demographically rural. This study aims to determine the correlation between knowledge and affective of oral health on the caries rate in Karangtengah Village. The study was observational analytical research. Subjects were selected using a purposive sampling technique. The total subjects were 388 residents. The knowledge and affective data were collected using a questionnaire, and the caries rate was scored using DMF-T. Data were analyzed using the Pearson correlation test (SPSS 22). The results revealed that the oral health knowledge and affective of the majority of Karangtengah Village residents were in the moderate category (48.7% and 66.8%, respectively), while the average DMF-T score was 13.12 (very high). The statistical analysis demonstrated no significant correlation between knowledge and DMF-T score and between the affective aspect of oral health and DMF-T score ( $p>0.05$ ). The moderate category of oral health knowledge and affective aspect in rural areas may not have been applied as oral health behaviors contribute to high dental caries rates.

**Keywords:** affective; DMF-T; knowledge; oral health; rural communities

## INTRODUCTION

Dental and oral health is still one of the health problems in Indonesia and worldwide that requires holistic and comprehensive treatment. One indicator of dental and oral health is the presence or absence of dental caries. Dental caries is a process of damage to the hard tissues of the teeth that begins through the decalcification of the tooth enamel layer, followed by the enzymatic lysis of organic structures to form cavities (holes). If not treated, the caries process will penetrate the enamel, dentin, and pulp.<sup>1</sup> Three main factors play a role in the formation of caries, namely host

or tooth factors, oral agents or microorganisms, and substrate or diet.<sup>2</sup> Severe cases of dental caries that result in cavities can progress to the dentin and pulp chamber, eventually leading to pulp necrosis and periapical abscess.<sup>3</sup>

Knowledge, attitudes, and behavior are the main factors influencing dental and oral health in developing countries. Knowledge or cognitive factors is a very important domain for the formation of behavior. Lack of knowledge about dental health is a predisposing factor for health behavior that leads to disease.<sup>4</sup> Attitude is knowledge accompanied by a tendency to

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act according to that knowledge. Based on previous research, the better the knowledge, attitudes, and behavior toward dental and oral hygiene maintenance are, the better the oral health status will be. Behavior toward the maintenance of dental and oral hygiene has the greatest influence on the health status of periodontal tissues in the pre-elderly community.<sup>5</sup>

The community's low knowledge, attitudes, and behavior often cause dental and oral health to be neglected.<sup>6</sup> Basic Health Research (Riskesdas) data in 2018 shows that as many as 94.7% of Indonesians brush their teeth daily, but only 2.8% brush them at the right time, after breakfast and before bed at night. It has an impact on dental and oral health problems, which are classified as high, namely 57.6%, with the average dental caries rate using a Decay, Missing, Filling (DMF-T) score of 7.1 included in the very high category according to WHO.<sup>7</sup>

The socioeconomic conditions of a community can affect the level of oral health. People in low socioeconomic conditions, for example, in rural areas, tend to have a worse DMF-T rate than those in high socioeconomic conditions, such as urban areas. The results of Riskesdas 2018 showed that the proportion of dental and oral health problems in rural communities is higher (58.2%) than in urban communities (57.2%), with the proportion of dental care for medical personnel also lower at only 6.9% compared to urban communities which reached 12.9%.<sup>7</sup> It could be influenced by the different socioeconomic levels and affordability of healthcare facilities in the two regions.<sup>8</sup>

Research on dental and oral health status differences between rural and urban communities has been conducted on elementary school students in underdeveloped villages in Bandung Regency.<sup>9</sup> This study covered a wider population in Karangtengah Village, Baturraden District, Banyumas Regency, Central Java Province, with adult respondents aged 18-65. This study aims to

determine the relationship between the level of knowledge and oral health attitudes on the dental caries rate of the people of Karangtengah Village as part of the Assisted Village program of the Faculty of Medicine, Jenderal Soedirman University.

## MATERIALS AND METHODS

The research was conducted observationally in the Karangtengah Village, Baturraden District, Banyumas Regency community from October 2019 - January 2020. The research sample was taken using a purposive sampling technique from all the heads of families, and we obtained a total sample of 388 people. Samples were taken based on inclusion and exclusion criteria. Data on the level of knowledge and attitudes toward oral health were collected using a questionnaire of 20 multiple-choice questions each. The validity and reliability tests of the questionnaires have been carried out previously and met the requirements of questions that are easy to understand and unbiased.

Oral dental examination was carried out using the WHO oral diagnostic set, periodontal probe, and the 2013 WHO Oral Health Assessment form. The form also includes several other examinations, including the condition of the teeth from the crown to the roots and the periodontal tissues. Data on the caries rate of permanent teeth was measured using DMF-T scoring. The examiner has been calibrated 100% with the Kappa test result of 1. Statistical analysis was done using the SPSS version 22 program with the Pearson correlation test to analyze the respective relationship between knowledge and attitude with dental caries rate (DMF-T).

## RESULT

Data on the age and gender distribution of the study sample showed that most of the study samples were women, with an even age distribution in the three adult age groups (Table 1).

**Table 1. Description of the age group and gender of the respondents in the Karangtengah Village Community**

|                  | Number of Samples | Percentage (%) |
|------------------|-------------------|----------------|
| <b>Age Group</b> |                   |                |
| 15-19            | 13                | 3.36           |
| 20-34            | 122               | 31.44          |
| 35-44            | 131               | 33.76          |
| >45              | 122               | 31.44          |
| <b>Sex</b>       |                   |                |
| Male             | 59                | 15.2           |
| Female           | 329               | 84.8           |
| Total            | 388               |                |
| Respondents      |                   |                |

Table 2 shows the results of the research respondents' answers to the questionnaire related to oral health knowledge. Most respondents could correctly answer the questions on oral health knowledge related to the frequency of brushing their teeth and the use of fluoridated toothpaste, the effect of food consumption on dental health, the causes of

tooth decay and its types, and the treatment of dental diseases. However, most respondents answered incorrectly when asked about the proper time to brush their teeth and the signs of tooth decay (questions 2 and 12).

Table 3 lists the results of the respondents' answers to the research questionnaire related to the respondents' oral health attitudes, consisting of 12 affirmative and 8 negative questions. Most respondents answered attitude questions about the habit of maintaining dental health and the need for dental examination and treatment at the dentist. However, some answers indicated an inappropriate attitude regarding the time to brush their teeth when bathing and going to the dentist only when there was a complaint (questions 9 and 12).

**Table 2. Distribution of Questionnaire Results of Oral and Dental Health Knowledge of Respondents in Karangtengah Village Community**

| No | Questions   | Percentage (%) |           |
|----|---|----------------|-----------|
|    |   | Correct        | Incorrect |
| 1  | Frequency of teeth brushing                             | 80.2           | 19.8      |
| 2  | The right time to brush your teeth                      | 37.9           | 62.1      |
| 3  | Toothpaste ingredients                                  | 95.4           | 4.6       |
| 4  | Time to change a new toothbrush                         | 70.6           | 29.4      |
| 5  | Time to visit the dentist                               | 67.3           | 32.7      |
| 6  | The result of brushing teeth too quickly                | 85.8           | 14.2      |
| 7  | Things which include the dentist's duties               | 87.4           | 12.6      |
| 8  | Types of food that can damage teeth                     | 86.6           | 13.4      |
| 9  | Reasons why the tooth cavities need filling             | 69.3           | 30.7      |
| 10 | Causes of red gums, swollen gums and gums easy to bleed | 89.7           | 10.3      |
| 11 | Types of services at the dental clinic                  | 80.9           | 19.1      |
| 12 | Symptoms of tooth cavities                              | 16.0           | 84.0      |
| 13 | Introduction to dentists for children                   | 56.4           | 43.6      |
| 14 | The action of the baby's loose teeth                    | 71.1           | 28.9      |
| 15 | The condition of healthy teeth                          | 80.2           | 19.8      |
| 16 | Effect of milk consumption on teeth                     | 89.7           | 10.3      |
| 17 | Foods that are good for oral health                     | 92.8           | 7.2       |
| 18 | Tooth surfaces to be brushed                            | 80.2           | 19.8      |
| 19 | Causes of gum recession                                 | 52.3           | 47.7      |
| 20 | The effect of betel leaf-chewing                        | 53.9           | 46.1      |
| 21 | What to do if there is hardened plaque on the teeth?    | 76.3           | 23.7      |
| 22 | Tooth cavities treatment                                | 61.6           | 38.4      |
| 23 | Causes of swollen gums                                  | 75.0           | 25.0      |
| 24 | Causes of calculus on teeth                             | 64.7           | 35.3      |
| 25 | Choice of treatment in case of toothache                | 96.1           | 3.9       |

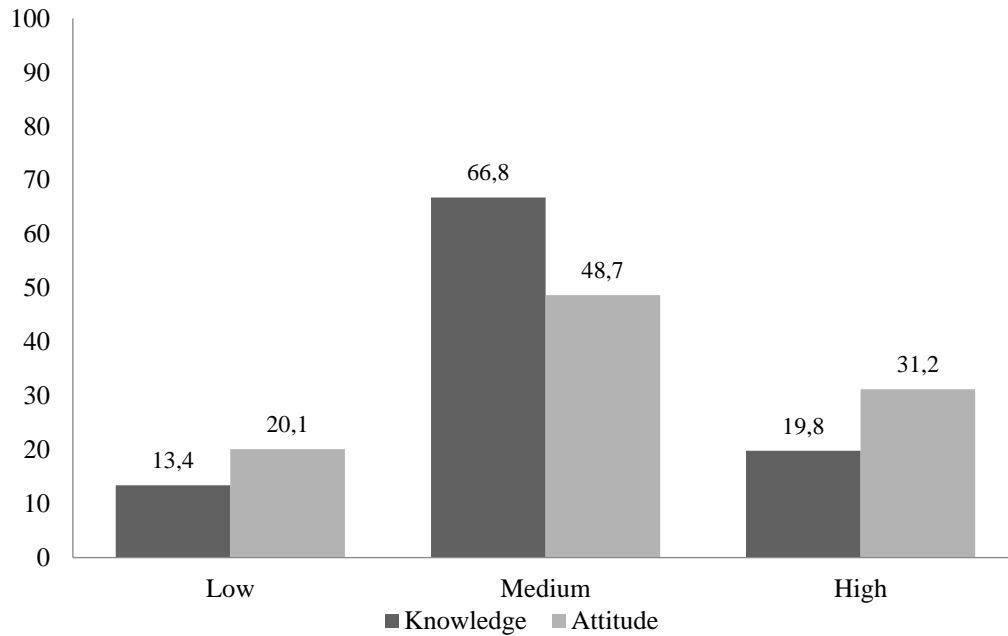
**Table 3. Distribution of Questionnaire Results of Oral Dental Health Attitudes of Respondents in Karangtengah Village Community**

| No | Questions   | Percentage (%) |       |          |          |                   |
|----|---|----------------|-------|----------|----------|-------------------|
|    |   | Strongly Agree | Agree | Doubtful | Disagree | Strongly disagree |
| 1  | If my family member has a toothache, I tell them to go to the dentist | 50.8           | 45.6  | 2.3      | 1.3      | 0.0               |
| 2  | Gargle using running water when brushing your teeth                   | 31.4           | 55.2  | 4.4      | 9.0      | 0.0               |
| 3  | Brushing teeth at least twice a day                                   | 38.7           | 53.9  | 2.8      | 4.6      | 0.0               |
| 4  | Brushing teeth before bed   | 42.3           | 47.4  | 7.0      | 3.1      | 0.3               |
| 5  | Change your toothbrush every 3 months                                 | 33.8           | 48.7  | 9.0      | 7.5      | 1.0               |
| 6  | Use mouthwash every day   | 11.6           | 32.0  | 22.9     | 29.9     | 3.6               |
| 7  | Do not clean the toothbrush after use                                 | 3.9            | 10.1  | 5.9      | 57.2     | 22.9              |
| 8  | If your tooth hurts, choose to take medicine that you buy at a shop   | 2.6            | 16.5  | 16.2     | 54.6     | 10.1              |
| 9  | Brushing my teeth when I take a shower                                | 4.6            | 21.4  | 10.8     | 54.1     | 9.0               |
| 10 | Never use my family member's toothbrush                               | 19.8           | 41.5  | 5.4      | 20.9     | 12.4              |
| 11 | Rarely use toothpaste   | 1.3            | 7.0   | 5.4      | 59.5     | 26.8              |
| 12 | Go to the dentist only if you have a toothache                        | 9.0            | 34.0  | 13.7     | 39.2     | 4.1               |
| 13 | Choose water drinks over sugary drinks                                | 30.4           | 60.3  | 7.0      | 2.1      | 0.3               |
| 14 | Brushing teeth every day  | 42.0           | 50.5  | 3.9      | 3.4      | 0.3               |
| 15 | Lazy to go to the dentist because the place is far from home          | 4.4            | 18.3  | 14.4     | 53.9     | 9.0               |
| 16 | Not cleaning the toothbrush with running water                        | 4.1            | 12.9  | 11.6     | 55.7     | 15.7              |
| 17 | Not afraid to check your teeth with the dentist                       | 33.5           | 50.5  | 6.7      | 7.2      | 2.1               |
| 18 | Gargle with clean water   | 44.1           | 51.5  | 4.1      | 0.3      | 0.0               |
| 19 | Always keep my teeth clean  | 36.9           | 58.0  | 4.1      | 0.8      | 0.3               |
| 20 | I'm lazy to brush my teeth when I have an oral ulcer because it hurts | 2.3            | 15.2  | 9.5      | 56.4     | 16.5              |

The results of the respondents' oral health knowledge and attitudes questionnaire scores are listed in Table 4 and are further categorized into low, medium, and high (Figure 1).

**Table 4. Knowledge and Attitude Scores on Oral Health of Respondents in Karangtengah Village Community**

| Questionnaire Components | Average ± SD | n |
|--------------------------|--------------|---|
| Knowledge                | 72.68 ± 3.71 | 3 |
| Attitude                 | 77.18 ± 8.15 | 8 |
|                          |              | 8 |



**Figure 1. Percentage of Category Level of Knowledge and Attitude of Oral and Dental Health in Karangtengah Village Community**

The level of knowledge and attitude of oral health of respondents in Karangtengah Village had an average of above 70 (out of a total score of 100) and most of them were in the medium category. The respondent's dental caries rate was calculated using the DMF-T score (Table 5).

**Table 5. DMF-T Score of Oral Health Survey of Respondents in Karangtengah Village**

| Component   | Average      | n   |
|-------------|--------------|-----|
| Decay (D)   | 8.61 ± 4.82  | 388 |
| Missing (M) | 4.39 ± 4.80  |     |
| Filling (F) | 0.93 ± 0.11  |     |
| DMF-T Score | 13.12 ± 6.38 |     |

Table 5 shows that the average respondent has 13.12 carious teeth (rounded up to 14 teeth) with a D score indicating untreated carious teeth of 8.81 (rounded up to 9 teeth). According to WHO, the average DMF-T score is included in the very high category (> 6.6).

**Table 6. Age Group-Based DMF-T Score of Respondents in Karangtengah Village Community**

| Age Group        | Numbers of Sample | DMF-T Score |
|------------------|-------------------|-------------|
| 15-19            | 13                | 7.08        |
| 20-34            | 122               | 11.80       |
| 35-44            | 131               | 12.70       |
| >45              | 122               | 15.53       |
| Total Respondent | 388               |             |

The results of the DMF-T score based on the age group of the respondents can be seen in Table 6 above, which shows an increase in the caries rate as the respondent's age increases.

Statistical analysis using the Pearson correlation test was conducted to determine the relationship between knowledge scores and respondents' oral health attitude scores (Table 7) and the relationship between each knowledge and oral health attitude score and respondents' DMF-T numbers (Tables 8 and 9).

**Table 7. Pearson Correlation Test Results between Knowledge and Attitude of Oral Dental Health in Karangtengah Village Community**

|                     | Knowledge | Attitude |
|---------------------|-----------|----------|
| Pearson correlation | 1         | .557     |
| Sig. (2-tailed)     |           | .000     |
| N                   | 388       | 388      |

The statistical analysis test results showed a significant relationship between knowledge and attitudes about dental and oral health ( $p < 0.05$ ).

**Table 8. Pearson Correlation Test Results between Knowledge of Oral Dental Health and DMF-T Rates in Karangtengah Village Community**

|                     | Knowledge | DMF-T |
|---------------------|-----------|-------|
| Pearson correlation | 1         | -.055 |
| Sig. (2-tailed)     |           | .280  |
| N                   | 388       | 388   |

**Table 9. Pearson Correlation Test Results between Oral Dental Health Attitudes and DMF-T Rates in Karangtengah Village Community**

|                     | Attitude | DMF-T |
|---------------------|----------|-------|
| Pearson correlation | 1        | -.004 |
| Sig. (2-tailed)     |          | .931  |
| N                   | 388      | 388   |

The statistical analysis test results showed no significant relationship between knowledge about dental and oral health with DMF-T numbers and between attitudes towards dental and oral health with DMF-T numbers ( $p > 0.05$ ).

## DISCUSSION

The results of this study indicated that the knowledge and attitudes of the respondents in Karangtengah Village about dental and oral health were in a good category, with a higher level of knowledge than the level of oral health attitudes, thus; there was a correlation between the two. However, the DMF-T dental caries score of the Karangtengah Village community was included in the very high category at 13.12, higher than the national average of 7.1.<sup>7</sup>

Dental and oral health is influenced by behavior that includes knowledge, attitudes, and actions. Knowledge of dental

and oral health is obtained through a complex cognitive process. Attitude is knowledge accompanied by a tendency to act according to that knowledge. Action is a level of knowledge that blends with attitudes and is owned by one's personal control. Good knowledge affects health behavior, especially dental and oral health. On the contrary, a lack of knowledge about the importance of dental and oral care can lead to neglecting dental and oral hygiene.<sup>10-12</sup>

The Pearson correlation statistical test proved that there was a relationship between the level of knowledge and the oral health attitude of the people of Karangtengah Village ( $p < 0.05$ ). However, there was an inverse correlation between knowledge scores and oral health attitudes with the DMF-T dental caries score ( $p > 0.05$ ). This result implied that the level of knowledge of the Karangtengah Village community had not reached the application stage in the form of actions to maintain oral health properly to prevent dental caries and other oral dental diseases. The knowledge and attitudes are only limited to attention, feelings, and perception. According to Notoadmodjo, knowledge is a cognitive domain ranging from knowing, understanding, application, analysis, and synthesis to evaluation.<sup>13</sup> In a group of communities, it can be found that a good level of knowledge is not in line with a high DMF-T index value because the knowledge is not applied optimally to encourage the behavior of maintaining daily dental and oral hygiene.<sup>10</sup>

Internal and external factors can influence the application of knowledge and attitudes in adherence to dental and oral health. According to the classical theory of H.L. Blum, health status can be influenced by 3 factors, namely, lifestyle, environment, and health services.<sup>14</sup> Lifestyle includes consuming sugary foods or drinks, brushing teeth in the right way and at the right time, and visiting the dentist. The knowledge and attitudes questionnaire results of the people of

Karangtengah Village, in general, indicated knowledge and attitudes related to lifestyle that can support dental health. However, some answers are inconsistent. For example, regarding the frequency of brushing their teeth, respondents' answers indicated that they brushed their teeth twice a day, but the exact time for brushing their teeth was incorrect, as seen from the answers that they only brushed their teeth while bathing. Brushing teeth should be done in the morning after breakfast and at night before going to bed. It can be added at other times, such as after consuming cariogenic food or drinks, to remove food and drink residues that settle on the tooth surface to prevent the demineralization process.

Regarding the examination to the dentist, respondents were able to answer the knowledge questionnaire that visiting the dentist should be routinely carried out every 6 months. However, on the attitude questionnaire, most answered only seeing the dentist if they had a toothache. The main purpose of conducting regular dental check-ups is to detect early damage that may occur to the teeth. Early detection and treatment are necessary to prevent tooth decay from worsening and developing a more severe condition. The oral health status of the respondents in the form of DMF-T scores indicated that the awareness level of the people of Karangtengah Village to go to the dentist was still low. It can be seen from the proportion of DMF-T scores dominated by D and M scores and less than 1 carious tooth per person who has been treated (score F). The paradigm that considers going to the doctor or dentist only if you are sick should be abolished, and the community awareness of the importance of always maintaining dental and oral health before and after experiencing dental and oral health problems should be instilled in the community.<sup>15</sup>

The results also revealed that the DMF-T score of the Karangtengah Village community increased along with the increasing age group. These results align

with previous studies, which showed that the prevalence of dental caries could be related to age. An increase of 33% was detected at the age of 15, and 67% was detected after the age of 30.<sup>15</sup> The decrease in the frequency of daily tooth brushing and increase in plaque index prevalence was found in the elderly population, which can correlate with higher dental caries rates in older people.<sup>16-18</sup>

Environmental factors that can affect the oral health of the people of Karangtengah Village are the rural communities' social environment, which is still relatively low in educational, social, and economic aspects.<sup>14,19</sup> Family environment can influence awareness about dental health. Since childhood, the habit of keeping teeth and mouth clean has been formed in the family. Parents have a role in teaching their children dental and oral health knowledge.<sup>20</sup> The community environment can also affect the habit of maintaining dental health as well as the motivation to seek treatment for oral dental problems at the dentist. Riskedas (*Baseline Health Research*) in 2018 showed that visiting dentists in rural communities who experienced oral dental complaints tended to be lower than in urban communities.<sup>7</sup> It is also reflected in the questionnaire results on the attitude of respondents in Karangtengah Village who have not visited the dentist regularly.

Health service factors, including access to distant health services and the availability of infrastructure, can also cause people not to receive adequate dental care when tooth decay occurs.<sup>10</sup> In general, the adequacy rate of dentists at Puskesmas in 68.69% areas in Central Java Province is in sufficient category, above the national average (42.46%), however in 31.31% areas is still in insufficient category.<sup>7</sup> The location of Karangtengah Village is 10 km from the city center of Purwokerto, and some Puskesmas facilities are relatively close (3.5 km).

## CONCLUSION

The dental caries rate of the people of Karangtengah Village, Baturraden District, Banyumas Regency, was still in the very high category, indicated by a DMF-T score of 13.12. It was inversely proportional to the level of knowledge and attitudes of oral health, in which the majority were in the medium and high categories. Furthermore, this study showed that to encourage the good oral health, the degree of oral health knowledge and affective should be combined with good oral health behavior.

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