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THE RELATIONSHIP OF TOOTH BRUSHING BEHAVIOR, DIETARY PATTERNS, ECONOMIC STATUS ON CARIES OF SOUTH DAHA POPULATION

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ABSTRACT

Background: Based on Riskesdas 2018, prevalence of caries between age of 55-64 is 96,8%. The DMT-T index in Samuda Village, South Daha is 8,2. Caries is the destruction of hard surface of the teeth caused by multifactorial etiology, such as host, substrate, time, microorganisms and predisposing factors like tooth brushing behavior, dietary patterns and economic status. **Objectives:** Analyzed the relationship between tooth brushing behavior, dietary patterns, economic status and dental caries of South Daha population. **Methods:** This study was an observational analytic research with cross sectional research design. The population was 2,559 people of South Daha aged between 55-64 and 108 people was involved in this study based on simple random sampling technique. **Results:** Correlation test result, using Somers'd test to analyze the relationship between tooth brushing behavior and dental caries, is 0.000 ($p < 0.050$), which means there is a relationship between tooth brushing behavior and dental caries with correlation strength is 0.582 (moderate). The correlation result between dietary patterns and dental caries is 0.000 ($p < 0.050$) with correlation strength is 0.239 (weak), which means there is a weak relationship between dietary patterns and dental caries. The correlation between economic status and dental caries is 0.000 ($p < 0.050$) with correlation strength is 0.353 (weak), which means there is a weak relationship between economic status and caries. **Conclusion:** There is a relationship between tooth brushing behavior and dental caries, there is a relationship between dietary patterns and dental caries and there is a relationship between economic status and dental caries.

Keywords: Caries, dietary patterns, economic status, tooth brushing behavior,

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INTRODUCTION

The biggest problem about dental and oral health facing the population of Indonesia and other developing countries is dental caries.¹ Based on Riskesdas 2018, 57.6% of Indonesians have dental and oral problems. The percentage of South Kalimantan Province for damaged, cavities, or toothache was 46.9% while the percentage of Hulu Sungai Selatan was 45.5%. Dental and oral health problems such as caries in the age of 55-64 have a percentage of 96.8%.² In people with an age of 55-64 often ignore the oral and teeth hygiene and complain of toothaches such as cavities.³ It happens because the older a person is, the longer he is exposed to the factors that cause dental caries so that it has more severe damage.⁴

Dental caries can be assessed using the DMF-T caries index. The DMF-T method is divided into

Decay, Missing, Filling Teeth.⁵ The DMF-T index of Hulu Sungai Selatan is 7.76 and the DMF-T index of civilian in Samuda Village, South Daha is 8.2.⁶ Based on Riskesdas 2018, the DMF-T index in the age of 55-64 reached 12.6 and can be categorized as very high.²

Dental caries is the destruction of hard tissues of teeth caused by multifactorial etiology, factors in the oral cavity consist of host factors, microorganisms, substrates and time.^{7,8} Dental caries is also influenced by outside factors of the oral cavity, namely behavior, environment, health services and heredity. Behavior plays an important role in influencing the health status of teeth and mouth. The example of good dental health maintenance behaviors such as regular tooth brushing. A Good tooth brushing behavior is the most effective way to prevent dental caries.⁹ Dental

caries can also be affected by diet. A person with a diet that likes cariogenic foods such as chocolate, milk, ice cream, candies, sweet cakes, sweet chips in a frequency of 2-3 times a day can trigger tooth decay because the acid from those foods can lower the pH of the oral cavity.¹⁰ Caries has a close relationship with low economic status. The low economic status indicates a high prevalence of dental caries, while people with high economic status have a lower prevalence of caries.¹¹

Based on data from South Daha District in Figures (2020) there is gum disease and periapical tissue which is included in the category of the top 10 most disease in the Bayanan Health Center, South Daha. From the aspect of the large number of periodontal disease, caries rates are obtained that increase over time. Based on data from the Annual Report on Health Examinations of the Bayanan Health Center in 2021, in 1,862 peoples examined, there were 80.24% or 1,494 peoples have caries. Based on the problems above, the researcher interested in conducting research on the relationship between tooth brushing behavior, dietary patterns and economic status on caries in South Daha population.¹²

MATERIALS AND METHODS

This study used analytical observational research methods with a cross sectional research design. This research has received an ethical eligibility permit issued by the Health Research Ethics Commission, Faculty of Dentistry, Lambung Mangkurat University No. 045/KEPKG-FKGULM/EC/IV/2022. The research was conducted in South Daha District, Hulu Sungai Selatan Regency, South Kalimantan Province in May 2022. The population in this study was 2,559 residents of South Daha District in the age of 55-64. The sample amounted to 108 respondents who were taken using a simple random sampling technique and determined based on inclusion criteria, namely residents of South Daha District in the age of 55-64 except residents of Muning Dalam Village and Muning Baru Village, residents who were cooperative and signed informed consent, respondent's teeth photos using plastic / metal spoons, photos were clearly visible and not blurry, the photo have to show the entirety teeth of the upper and lower jaws from the front, right and left views.

Tooth brushing behavior, dietary patterns and economic status were measured using a questionnaire. Measurement of the results using the Likert scale. Answers with code A have a score of 4, code B have a score of 3, code C have a score of 2 and code D have a score of 1. The value of 0% to 20% belongs to the very bad category, the value of 21% to 40% belongs to the bad category, the value

of 41% to 60% belongs to the medium category, the value of 61% to 80% belongs to the good category and the value of 81% to 100% belongs to the very good category. In determining the value of the questionnaire score used the following formula:

$$Y = \text{Likert total score} \times \frac{\text{The sum of respondent Total Score of Questionnaire}}{Y \times 100}$$

Caries was measured using the DMF-T caries index by taking photos of respondent's teeth with teledentistry reference using a Canon Eos 600D DSLR camera and a 70-200mm F2.8 Tele Zoom lens. Code D (Decay) means there are teeth with caries that can still be filled, temporary fillings, teeth with secondary caries but still can be filled. Code M (Missing) means there is a tooth with an indication of being extracted and a tooth that has been extracted due to caries. Code F (Filling) means there is a tooth that has been permanently filled and the filling is still good. The measurement results of the DMF-T index are divided into 5 categories, very high (≥ 6.6), high (4.5-6.5), medium (2.7-4.4), low (1.2-2.6) and very low (0.0-1.1). In determining the value of DMF-T used the following formula:

$$\text{DMF-T Index} = \frac{D + M + F}{\text{The sum of respondent}}$$

Furthermore, the data were analyzed by univariate and bivariate analysis using the Somers'd correlation test.

RESULT

This study used 108 respondents from South Daha in the age of 55-64 in May 2022. The results of the research can be seen in table 1.

Table 1. Age of Respondents

Age	Frequency	
	N	%
55 years old	24	22,22
56 years old	6	5,56
57 years old	11	10,19
58 years old	7	6,48
59 years old	6	5,56
60 years old	20	18,52
61 years old	6	5,56
62 years old	7	6,48
63 years old	9	8,33
64 years old	12	11,11
Amount	108	100

Table 1 shows that the respondents in this study were mostly 55 years old, which is 24 (22.22%) respondents.

Table 2. Gender of Respondents

Gender	Frequency	
	N	%
Female	61	56,8
Male	47	43,5
Amount	108	100

Table 2 shows that the respondents in this study were mostly female, which is 61 (56.8%) respondents.

Univariate Analysis

The results of the study on tooth brushing behavior in 108 residents of South Daha in the age of 55-64 can be seen in table 3. The results of tooth brushing behavior were most found in the bad category, which is 59 (54.6%) respondents.

Table 3. Tooth Brushing Behavior Measurement Results

Tooth Brushing Behavior	N	%
Very Bad	6	5,5
Bad	59	54,6
Moderate	12	11,1
Good	20	18,5
Very Good	11	10,1
Amount	108	100

The results of the study on dietary patterns in 108 residents of South Daha in the age of 55-64 can be seen in table 4. The results of the dietary patterns measurements were most found in the bad category, which is 44 (40.7%) respondents.

Table 4. Dietary Patterns Measurement Results

Dietary Patterns	N	%
Very Bad	12	11,1
Bad	44	40,7
Moderate	17	15,7
Good	17	15,7
Very Good	18	16,6
Amount	108	100

The results of the study on the economic status of 108 residents of South Daha in the age of 55-64 can be seen in table 5. The results of economic

status measurements were most found in the moderate category, which is 40 (37%) respondents.

Table 5. Economic Status Measurement Results

Economic Status	N	%
Very Low	16	14,8
Low	36	33,3
Moderate	40	37
High	9	8,3
Very High	7	6,3
Amount	108	100

The DMF-T index measurement consists of decay, missing, and filling components. The results of the DMF-T index in residents of South Daha in the age of 55-64 are shown in table 6. The table shows that the number of cavities or caries (decay) was 1011 cases, teeth extracted due to caries (missing) were 472 cases, and filled teeth (filling) were 48 cases. Based on the results of the DMF-T index measurement, it was found that the average of DMF-T index was 14.1 (very high).

Table 6. DMF-T Index Measurement Results

DMF-T	Jumlah Kasus
<i>Decay</i>	1011
<i>Missing</i>	472
<i>Filling</i>	48
Rata-rata	14,1

Table 7. DMF-T Index Measurement Results Based on DMF-T Index Category

DMF-T Index Category	N	%
Very High	72	66,6
High	7	6,4
Moderate	9	8,3
Low	9	8,3
Very Low	11	10,1
Amount	108	100

The assessment of dental caries by DMF-T index category can be seen in table 7. The table shows that the DMF-T index with a very high category is the category with the highest number of

respondents among other categories, namely 72 (66.6%) respondents, therefore it can be said that the DMF-T index of residents of South Daha in the age of 55-64 is in the category of a very high DMF-T index.

Bivariate Analysis

The analysis of the relationship of tooth brushing behavior to caries can be seen in table 8. Based on the table, it shows that bad category of tooth brushing behavior that has a very high category of DMF-T index has the highest number, which is 56 (94.9%) respondents. Based on the results of statistical analysis using Somers'd test, it was obtained by 0.000 ($p < 0.050$) which means that H_0 was rejected or there was a relationship between tooth brushing behavior towards caries of residents of South Daha. The results showed that the correlation value is 0.582, which means there was a moderate-strong relationship between tooth brushing behavior and caries of the South Daha population.

The analysis of the relationship of dietary patterns to caries can be seen in table 9. Based on the table, it shows that bad category of dietary

patterns that has a very high category of DMF-T index has the highest number, which is 38 (29,3%) respondents. Based on the results of statistical analysis using Somers'd test, it was obtained by 0.000 ($p < 0.050$) which means that H_0 was rejected or there was a relationship between dietary patterns towards caries of South Daha population. The results showed that the correlation value is 0.239, which means there was a weak relationship between dietary patterns and caries of the South Daha population.

The analysis of the relationship of economic status to caries can be seen in table 10. Based on the table, it shows that low category of economic status that has a very high category of DMF-T index has the highest number, which is 32 (88,9%) respondents. Based on the results of statistical analysis using Somers'd test, it was obtained by 0.000 ($p < 0.050$) which means that H_0 was rejected or there was a relationship between economic status towards caries of South Daha population. The results showed that the correlation value is 0.353, which means there was a weak relationship between economic status and caries of the South Daha population.

Table 8. The Relationship of Tooth Brushing Behavior and Caries

Variable	DMF-T Index					Amount	P Value	Correlation	
	Very High	High	Moderate	Low	Very Low				
Tooth Brushing Behavior	Very Bad	6 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (100%)	0,000	0,582
	Bad	56 (94,9%)	0 (0%)	1 (1,7%)	1 (1,7%)	1 (1,7%)	59 (100%)		
	Moderate	5 (41,7%)	3 (25%)	2 (16,7%)	1 (8,3%)	1 (8,3%)	12 (100%)		
	Good	4 (20%)	2 (10%)	4 (20%)	3 (15%)	7 (35%)	20 (100%)		
	Very Good	1 (9,1%)	2 (18,2%)	2 (18,2%)	4 (36,4%)	2 (18,2%)	11 (100%)		

Table 9. The Relationship of Dietary Patterns and Caries

Variable	DMF-T Index					Amount	P Value	Correlation	
	Very High	High	Moderate	Low	Very Low				
Dietary Patterns	Very Bad	8 (66,7%)	3 (25%)	0 (0%)	0 (0%)	1 (8,3%)	12 (100%)	0,000	0,239
	Bad	38 (29,3%)	1 (2,3%)	0 (0%)	2 (4,5%)	3 (6,8%)	44 (100%)		
	Moderate	11 (64,7%)	0 (0%)	0 (0%)	2 (11,8%)	4 (23,5%)	17 (100%)		
	Good	11 (64,7%)	2 (11,8%)	1 (5,9%)	3 (17,6%)	0 (0%)	17 (100%)		
	Very Good	4 (22,2%)	1 (5,6%)	8 (44,4%)	2 (11,1%)	3 (16,7%)	18 (100%)		

Table 10. The Relationship of Economic Status and Caries

Variable	DMF-T Index					Amount	P Value	Correlation	
	Very High	High	Moderate	Low	Very Low				
Economic Status	Very Low	14 (87,5%)	2 (12,5%)	0 (0%)	0 (0%)	0 (0%)	16 (100%)	0,000	0,353
	Low	32 (88,9%)	2 (5,6%)	0 (0%)	2 (5,6%)	0 (0%)	36 (100%)		
	Moderate	21 (52,5%)	3 (7,5%)	4 (10%)	5 (12,5%)	7 (17,5%)	40 (100%)		
	High	4 (44,4%)	0 (0%)	2 (22,2%)	1 (11,1%)	2 (22,2%)	9 (100%)		
	Very High	1 (14,3%)	0 (0%)	3 (42,9%)	1 (14,3%)	2 (28,6%)	7 (100%)		

DISCUSSION

The results of the DMF-T index assessment on 108 residents of South Daha in the age of 55-64 was 14.1 and can be said to be a very high category. The results of this study showed that 99% of the population had cavities. The results of this study are in accordance with Riskesdas 2018 which states that the age of 55-64 has the highest percentage of caries among other age as much as 96.8% with a DMF-T index 12.6 which is included in the very high category.² The results of this study are also supported by research conducted by Utami *et al* (2020) which states that the DMF-T index of civilian in Samuda Village, South Daha has a very high category which is 8.2.⁶

Tooth brushing behavior is one of the most effective ways to maintain dental and oral health but the elderly often ignore it.¹³ According to the results of the study, it shows that residents in the age of 55-64 in South Daha mostly have bad category of tooth brushing behavior according to the Likert scale with the number of respondents is 54.6%. The results of this study are in accordance with the results of a study by Napitupulu *et al* (2019) which showed that respondents had bad category of tooth brushing behavior according to the Likert scale with the number of respondents is 40%.⁹ The analysis results of the relationship between tooth brushing behavior and caries showed that there is a relationship between tooth brushing behavior and caries of South Daha population. The results of this study are in accordance with research conducted by Cahyadi *et al* (2018) and Napitupulu *et al* (2019), which stated that there is a relationship between tooth brushing behavior and caries.^{9,14} It happens because the population is still wrong in the time, frequency and tooth brushing technique that can trigger the onset of caries. According to Suryani's research (2017), teeth should be brushed at 30 minutes after eating and before bedtime. The recommended duration of brushing teeth is at least 5 minutes, because if brushing the teeth is too quick, the results

will be not as good as brushing the teeth for a longer time, considering how much area of the tooth surface that must be brushed. The toothbrush should be replaced after 3 months of use, but if about a week the brush looks bad it means there is a mistake in how to brush the teeth. The longer someone brush the teeth in the right way, also the lower of debris so that the caries rate can also decrease.¹⁵

The number of caries can also be influenced by dietary patterns. Dietary patterns is the regulation of foods with healthy and beneficial nutritional intake for health.¹⁶ Based on the results of the study, it shows that the population in the age of 55-64 in South Daha mostly has a dietary patterns assessment with a bad category with the number of respondents is 40.7%. The results of this study are in accordance with research conducted by Annissa *et al* (2019) which states that respondents have a bad category dietary patterns assessment with the number of respondents is 54.1%.¹⁷ The analysis results of the relationship between dietary patterns and caries showed that there is a relationship between dietary patterns and caries of South Daha population. The results of this study are in accordance with research conducted by Hamid *et al* (2017) and Friandi (2021) which stated that there is a relationship between dietary patterns and caries incidence.^{10,16} The bad cariogenic diet is if cariogenic foods or beverages are consumed three times a day or more. The good cariogenic diet is if cariogenic foods or beverages are consumed less than three times a day outside of the three main meals.¹⁸ The dental caries index increases when the frequency of cariogenic foods is high, on the contrary decreases at the rare frequency or never at all, this is due to the acid formed by cariogenic foods will reduce the pH of the oral cavity within 2.5 minutes and create an acidic atmosphere and then will be a demineralization process that will last for 30 minutes-1 hour after eating. Therefore, if cariogenic foods are consumed three times a day, the pH of the oral cavity within 3 hours will be

below pH 5.5. The process of demineralization in such a period of time is enough to erode the enamel layer.^{16,19}

Dental caries is the destruction of hard surface of the teeth caused by multifactorial etiology such as predisposing factors like economic status. A person with a low level of economic status will experience poor dental and oral health so that they are more at risk of caries due to lack of knowledge about dental and oral health.²⁰ Based on the results of the study, it shows that the population in the age of 55-64 in South Daha mostly has economic status with a moderate category with 37% respondents. The results of this study are in accordance with the results of Jumriani's research (2017) which states that respondents have a moderate level of economic status with 57.5% respondents.²¹ Based on analysis of the relationship between economic status and caries showed that there is a relationship between economic status and caries of South Daha population. The results of this study are in accordance with the results of research conducted by Fithriyana (2021) and Fatmasari (2017) which stated that the statistical tests in the study showed that there is a relationship between economic status and caries. The higher level of a person's economic status, the lower incidence of dental caries.^{20,22} A person with low economic status will more focus on fulfil the primary, secondary, tertiary needs that will support his life first than choose quality of health services at once.²⁰

Based on the research, it can be concluded that the tooth brushing behavior measurement of South Daha population in the age of 55-64 can be categorized as bad, the dietary patterns can be categorized as bad and the economic status can be categorized as moderate. The DMF-T measurement results is 14,1 (very high). The results also showed that there is a relationship between tooth brushing behavior, dietary patterns and economic status on caries of South Daha population.

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