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The relationship between the severity of dental caries and the nutritional status of children

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ABSTRACT

Nutritional status is a factor that can determine the quality of human resources. Factors associated with nutritional status include health status and level of consumption of nutrients. Dental caries is a disease that can affect the nutritional condition of the child so that it can cause nutritional problems. Consumption levels of nutrients such as carbohydrates, proteins and fats are not only related to nutritional status but may also be associated with the severity of dental caries. The sample used in this study amounted up to 50 people. Based on the multivariate test results obtained that the level of carbohydrate consumption is a factor confounding the relationship between the severity of dental caries and the nutritional status of students in grade two. The school is expected to increase participation in the school canteen in the provision of nutritious foods and to increase the involvement of teachers in providing information about the behavior of clean and healthy. For further research it is expected to examine the variables that were not examined in this study. The school is expected to increase participation in the school canteen in the provision of nutritious foods and to increase the involvement of teachers in providing information about the behavior of clean and healthy. For further research it is expected to examine the variables that were not examined in this study. The school is expected to increase participation in the school canteen in the provision of nutritious foods and to increase the involvement of teachers in providing information about the behavior of clean and healthy. For further research it is expected to examine the variables that were not examined in this study.

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1. INTRODUCTION

The quality of Human Resources (HR) is one of the main factors required in carrying out national development. The nutritional status of the community as described by the nutritional status of children under five, school children, pregnant women and other nutritionally vulnerable groups is an indicator that can be used to assess the quality of human resources (Soetjiningsih, 1998). The need for nutrients changes throughout the life cycle and is related to the growth and development of each of these life stages (Deri, 2009).

Elementary school age children are also known as the school period. Children who are in this period range from 6 to 12 years of age who have stronger, individual characteristics, are active and do not depend on their parents (Moehji, 2003). The nutritional needs of elementary school children can affect nutritional status. Therefore, the food consumed must meet good nutrition in order to achieve optimal nutritional status (Almatsier, 2002). According to Suhardjo (1989), nutritional status can be influenced by various factors, namely food consumption, infectious diseases, mother's education and mother's employment status.

Based on Basic Health Research (RISKESDAS) (2007), the highest prevalence of underweight school-age children was in East Nusa Tenggara at 23.1% for boys and 19.1% for girls. Furthermore, the lowest prevalence of wasting was in Bali, namely 8.3% for boys and 6.9% for girls. Meanwhile, the prevalence of underweight school-age children in boys in West Java province was 10.9% and 8.3% in girls. The prevalence rate for the category of wasting in West Java is lower than the national rate, namely 13.3% for boys and 10.9% for girls.

The nutritional status of children will affect the process of growth and development. The growth and development of children is influenced by internal factors in the form of physical structure and the growth rate of brain cells while in the womb. Meanwhile, external factors include the quality of nutrition received by children and health status, namely the presence or absence of diseases such as dental caries, the cultural system used in the treatment process and the economic and social level (Nurdadi, 2000 in Junaidi, 2004).

Dental caries is a disease that affects about 90% of children (Damanik, 2009). Dental caries is an important health problem because abnormalities in these teeth can affect anyone regardless of age and if allowed to continue will be a focal source of infection in the mouth, causing complaints of pain. This condition of course will reduce the frequency of children's attendance at school, interfere with learning concentration, affect nutritional intake so that it can result in growth disturbances which will affect children's nutritional status and can have implications for the quality of resources (Siagian, 2008).

The eating habits of elementary school children that are often found in general are consuming snacks at school so that children do not eat breakfast, eat lunch outside the home, are irregular and do not meet nutritional needs. This will affect the child's appetite at home and can cause children to be malnourished (Wahyuti, 1991). Intake of nutrients in food is not only related to growth and development of the body in children but also related to dental caries. According to Nizel (1981), in his research described that there is a relationship between nutrients such as protein and carbohydrates contained in daily food can affect the occurrence of dental caries. Consumption of soft and sticky foods can also have a direct effect on the occurrence of dental caries (Nurlaila, 2005). Furthermore, according to Kabara (1986), there is a relationship between fat and the occurrence of dental caries.

Dental caries in Indonesia is a dental and oral health problem that still needs attention. Based on the Household Health Survey (SKRT, 2004), the prevalence of dental caries in Indonesia reaches 90.05% (Ministry of Health RI, 2000). The prevalence of dental caries in urban areas tends to increase from Pelita III to Pelita IV, namely from 73% to 73.20%, the same thing occurs in rural areas, from 67.23% to 71% with an index of the average number of teeth affected by caries per child. from 2.06 teeth to 2.50 teeth (Ilyas, 2000). Dental caries is also a disease that affects many children. The survey results for the provinces of DKI Jakarta and West Java in 1994/1995 showed that only 14% of children under 10 years of age were free of dental caries (Ministry of Health RI, 2001). This data is also reinforced by data from the Tasikmalaya City Health Office (DKK) which shows that in 2004, the

prevalence of dental caries in elementary school children was 56.2%. The prevalence of dental caries is far above the standard set by the Indonesian Ministry of Health, which is 10% (Hidayanti, 2005). Furthermore, according to Ririn's research in 2009, out of 265 second-grade elementary school students in Bandung, the prevalence of dental caries was 94.71% (Luchan, 2009).

2. RESEARCH METHOD

Based on the theoretical framework above, the researcher intends to conduct research on the factors that cause nutritional problems, especially to determine the relationship between the severity of dental caries and the nutritional status of second grade students at SDN 01 Ciangsana Ciangsana Village, Bogor Regency in 2010.

The variables of this study consisted of the dependent variable, namely nutritional status, the independent variable, namely the severity of dental caries and the confounding variables, namely the level of consumption of carbohydrates, the level of consumption of protein, and the level of consumption of fat. The variables of mother's education and mother's occupation were not examined because they were homogeneous. Based on the existing theoretical framework, the conceptual framework used for this research is as shown in chart 3.1.

Method of collecting data

The data used in this study are: a.Nutritional status data was obtained by taking anthropometric measurements which included the child's weight and height. Body weight was measured using a bath scale with an accuracy of 0.5 kg and body height using a microtoise with an accuracy of 0.1 cm. Subjects were measured barefoot. Hats, sweaters and school bags should also be left behind. The child stands with his back to the wall, the height measuring tape is right in the middle of the head and the line of sight is straight ahead. The position of the head, shoulder blades, hips and heels against the wall. Nutritional status is determined by calculating the z-score based on the index of body weight for height (BB/TB) using the WHO-NCHS 1983 reference standard b. Data on the severity of dental caries was obtained by carrying out a dental health examination using a sonde and mouth mirror which was carried out by two dental nurses. The dental nurse examines caries by looking at carious teeth that can still be filled (d), extracted (e) and already filled (f), then added up (d + e + f = def-t index) and recorded on the form provided. Determination of the severity of dental caries by comparing the sum results with the def-t index classification according to WHO.

Data on carbohydrate, protein and fat consumption levels were obtained using recall forms and 24-hour recall interviews aimed at mothers and second grade students who were respondents. This method was carried out by public health students specializing in nutrition for 2 days. The results obtained will then be compared with the nutritional needs of each subject.

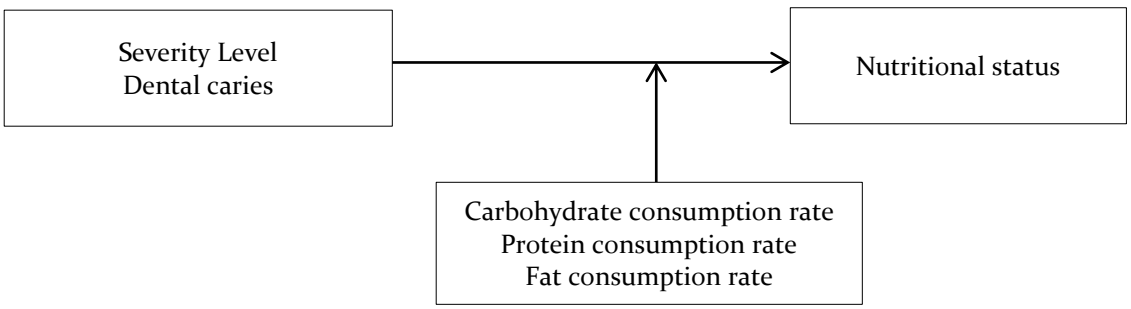

Figure 1. Conceptual framework

Data Processing Techniques

The data that has been collected by the researcher will then be processed using a computer program including: a. Ediyng, Checking data against questionnaire sheets and dental caries examination sheets was carried out during the data collection process which aims to ensure that all variables are filled in. During the process, the researcher edited the data so that erroneous or doubtful data could be directly traced back to the respondent concerned b. Coding. The coding process was carried out on several variables in this study, namely nutritional status, the severity of dental caries, the level of carbohydrate consumption, the level of protein consumption and the level of fat consumption. The initial data of these variables is numerical data, for the purposes of analysis and ease of interpretation, grouping is carried out, where each variable is divided into two groups. For nutritional status variables, thin if < - 2 SD and coded 0, while normal if > - 2 SD and coded 1. Variable severity of dental caries, high if def-t > 2.6 and coded 0, while low if def-t < 2.6 and coded 1. Variable level of carbohydrate, protein and fat consumption, less if < 80% RDA and coded 0, while good if > 80% RDA and coded 1 c. Entry, data that has been coded and then entered into a statistical software program for data analysis d. Cleaning, then data cleaning or re-checking is carried out to ensure that there are no errors in entering. whereas normal if > - 2 SD and coded 1. Dental caries severity variable, high if def-t > 2.6 and coded 0, while low if def-t < 2.6 and coded 1. Consumption level variable carbohydrates, protein and fat, less if < 80% RDA and coded 0, while good if > 80% RDA and coded 1 c. Entry, data that has been coded and then entered into a statistical software program for data analysis d. Cleaning, then data cleaning or re-checking is carried out to ensure that there are no errors in entering. whereas normal if > - 2 SD and coded 1. Dental caries severity variable, high if def-t > 2.6 and coded 0, while low if def-t < 2.6 and coded 1. Consumption level variable carbohydrates, protein and fat, less if < 80% RDA and coded 0, while good if > 80% RDA and coded 1 c. Entry, data that has been coded and then entered into a statistical software program for data analysis d. Cleaning, then data cleaning or re-checking is carried out to ensure that there are no errors in entering. 80% RDA and coded 0, while good if > 80% RDA and coded 1 c. Entry, data that has been coded and then entered into a statistical software program for data analysis d. Cleaning, then data cleaning or re-checking is carried out to ensure that there are no errors in entering. 80% RDA and coded 0, while good if > 80% RDA and coded 1 c. Entry, data that has been coded and then entered into a statistical software program for data analysis d. Cleaning, then data cleaning or re-checking is carried out to ensure that there are no errors in entering.

3. RESULTS AND DISCUSSIONS

Education is an important factor in improving the quality of human resources. The Bogor district government provides a large number of schools, both public and private. Ciangsana 01 Public Elementary School is located in Ciangsana Village, Gunung Putri District, Bogor Regency. This school was founded in 1969 and until now the school has experienced various development improvements so as to increase the effectiveness of teaching and learning activities which in the end can achieve the goals of the school. The number of teachers at the school is 12 people consisting of 10 people as homeroom teachers and 2 people as subject teachers.

Second grade students at SDN 01 Ciangsana Ciangsana Village, Bogor Regency, were the respondents in this study. The required number of students is 50 people. The frequency distribution of the characteristics of respondents based on gender, mother's education and mother's working status can be seen in table 5.2 below.

Table 1. Frequency Distribution of Respondent Characteristics Based on Gender, Mother's Education and Mother's Working Status in 2010

Variable	**N**	%
Gender		
Man	24	48
Woman	26	52
Mother's Education		
SD	15	30
junior high school	12	24
high school	19	38
PT	4	8
Mother's Working Status	44	88
Doesn't work		
Work	6	12

Based on table 5.2, of the 50 students who were respondents it was known that the number of male students was 24 people or 48% and female students were 26 people or 52%. The number of students who have mothers with elementary education is 15 people or 30%, junior high school is 12 people or 24%, high school is 19 people or 38% and tertiary education is 4 people or 8%, and the number of students who have mothers who are not working by 44 people or 88% and students who have mothers with working status by 6 people or 12%.

Univariate analysis

The nutritional status of children can be measured anthropometrically and categorized by the indices of weight/age, height/age and weight/height. In this study, anthropometric results in the form of measurements of body weight and height were categorized using the BB/TB index by looking at the z-score value. The classification used is based on the 2004 Ministry of Health, namely the nutritional status of second grade students in the thin category if the z-score value < -2SD. Meanwhile, the nutritional status of grade two students is normal if the z-score is > -2 SD. The frequency distribution of the nutritional status of second grade students at SDN 01 Ciangsana, Ciangsana Village, Bogor Regency can be seen in table 5.3 below.

Table 2. Frequency Distribution of Nutritional Status of Second Grade Students at SDN 01 Ciangsana Ciangsana Village, Bogor Regency, 2010

Nutritional status	N	%
Skinny (z-score < -2 SD)	33	66
Normal (z-score > -2 SD)	17	34
Total	50	100

Based on table 5.3, from 50 respondents it can be seen that the majority of respondents have a thin category of nutritional status, namely 33 people or 66%.

Description of the Severity Level of Dental Caries

The severity of dental caries was determined using the def-t index which is the caries measurement index for milk teeth recommended by Pine (1997). In this study, the classification of the severity of dental caries was in the high category if the def-t index value was > 2.6. Meanwhile,

the low category if the def-t index value < 2.6. The frequency distribution of the severity of dental caries for second grade students at SDN 01 Ciangsana, Ciangsana Village, Bogor Regency can be seen in table 5.4 below.

Table 3. Frequency Distribution of Dental nCaries Severity Level of Second Grade Students of SDN 01 Ciangsana Ciangsana Village, Bogor Regency, 2010

Tooth		
High (def-t > 2.6)	37	74
Low (def-t < 2.6)	13	26
Total	50	100

Based on table 5.4, from 50 respondents it can be seen that the majority of respondents have a high level of dental caries severity, namely 37 people or 74%.

Description of Carbohydrate, Protein and Fat Consumption Levels

Carbohydrates, proteins and fats are macronutrients needed by the body. In this study the classification used was based on the Ministry of Health of the Republic of Indonesia (1990), namely the level of consumption of carbohydrates, protein and fat is less if the percentage of achieving the consumption of each of these nutrients is <80% RDA. Meanwhile, the level of consumption of carbohydrates, protein and good fats.

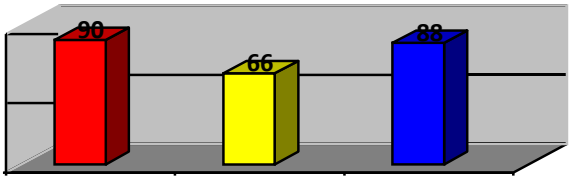

Image 1. Description of Consumption of Malnutrition of Carbohydrates, Proteins and Fat of Grade

Based on Figure 5.1, out of 50 respondents it can be seen that the majority of respondents have a low level of consumption of carbohydrates, protein and fat or the percentage of achieving nutrients is less than 80% of the Nutrition Adequacy Rate (RDA).) is recommended. The level of carbohydrate consumption is less, owned by 90% of respondents. Furthermore, the level of consumption of less protein, owned by 66% of respondents and for the level of consumption of less fat, owned by 88% of respondents.

Bivariate Analysis

To determine the relationship between the severity of dental caries and the nutritional status of second grade students at SDN 01 Ciangsana Ciangsana Village, Bogor Regency in 2010, the chi-square test was used which is presented in table 5.5 below.

Table 4. Description of Severity Level of Dental Caries and Nutritional Status of Second Grade Students at SDN 01 Ciangsana Ciangsana Village, Bogor Regency in 2010

	n	**%**	**N**	**%**	**n**	**%**	
Tall	31	83.8	6	16,2	37	100	0.000
Low	2	15,4	11	84.6	13	100	

Multivariate Analysis

Multivariate analysis was carried out to see the possibility of the influence of carbohydrate, protein and fat consumption levels, in addition to the severity of dental caries on the nutritional status of second grade students at SDN 01 Ciangsana Ciangsana Village, Bogor Regency using multiple logistic regression analysis with a risk factor model. The stages in carrying out the analysis are as follows:

Table 5. Selection of Variable Candidates for the Multivariate Modeling Stage

No	Variable	Pvalue
1	Dental Caries Severity Level	0.000*
2	Carbohydrate Consumption Rate	0.040*
3	Protein Consumption Rate	1,000
4	Fat Consumption Rate	3,396
	*:variable entered model	

There are two variables that have a Pvalue <0.25. Thus the variables that will be included in the model are the severity of dental caries and the level of carbohydrate consumption.

Study Design

The research study design used in this study was cross-sectional, risk factors and effects were studied at the same time. In addition, the risk factors and effects were measured only once, namely according to the conditions at which they were observed. Thus, the design of this study cannot more accurately describe the development of problems and risk factors. In addition, the design of this study also cannot explain with certainty the risk factors that precede effects because this requires a clear time sequence between risk factors and effects. So the use of this study design to analyze the relationship between risk factors and effects is limited.

Method of collecting data

Data collection regarding the level of carbohydrate, protein and fat consumption was carried out using a 24-hour recall which required good memory and honesty from the respondents. So that the tendency of respondents to provide inaccurate information can occur and can affect research results.

The results of this study indicate that most of the respondents have a nutritional status in the category of thin. These results can indicate that there is an imbalance between the intake of nutrients that enter the body with the body's need for nutrients. Underweight nutritional status that occurs in school-age children can have various negative impacts on the quality of human resources, considering that they are the next generation of the nation.

Based on the results of the study, it was found that most of the respondents with a nutritional status in the underweight category were respondents who had a high level of dental caries severity. Based on the results of statistical tests showed that there was a significant relationship between the severity of dental caries and the nutritional status of grade two students. The results of this study are in line with Junaidi's research (2004), which stated that children with a nutritional status in the underweight category suffer more from a high category of caries severity than children who have a low level of caries severity.

The low nutritional status of children with dental caries in this study was caused by the inability of children to consume a variety of foods due to impaired function of the teeth as digestive organs. This is similar to the opinion of Junaidi (2004), that dental caries can cause tooth loss which

will reduce the efficiency of mastication which results in disruption of the food digestive system so that it can interfere with body health because food nutrients cannot be absorbed properly by the small intestine.

According to Almatsier (2002), if the amount of energy produced by carbohydrates is insufficient in the body's metabolic processes, the body will take energy from protein. Amino acids and glycerol derived from fat can be converted into glucose for energy purposes for the brain and central nervous system, so that it will disrupt the state of the child's nutritional status.

The results showed that there was a significant relationship between the level of carbohydrate consumption and the nutritional status of second grade elementary school students. The nutritional status of the underweight category was more owned by students with low levels of carbohydrate consumption compared to children with good levels of carbohydrate consumption. This is reinforced by Junaidi's research (2004), which shows that children with nutritional status in the underweight category tend to have less carbohydrate consumption or lower than the recommended Nutrition Adequacy Rate (RDA). Therefore, action is needed in managing children's activities such as play time. These actions can help children to get enough rest time.

Breakfast habits are a factor that can affect nutritional status. Consuming foods that contain carbohydrates in the morning will prevent elementary school children from consuming snack foods. This was reinforced by Wahyuti (1991) who stated that the eating habits of elementary school children that are often found in general are consuming snacks at school so that children do not eat breakfast. This will affect the child's appetite at home and can cause the child to lack nutrient intake.

Underweight nutritional status and low levels of fat consumption will also disrupt children's dental health. The nutritional status of the underweight category and the level of consumption of less fat can also disrupt children's dental health. Research conducted by Alvarez (1995), states that the nutritional status of children will affect the growth of teeth, both baby teeth and permanent teeth. Children with underweight nutritional status will experience a higher level of caries severity than children with normal nutritional status. Nutritional status in early life affects the formation and growth of teeth. If there is a nutritional disorder, it will affect the formation of teeth and result in increased susceptibility to caries.

According to Budiningsari (2006), foods that contain fat, generally contain little cariogenic substrate other than as a substitute for cariogenic carbohydrates, fat also affects the solubility of carbohydrates in the oral cavity. Fat functions towards a local effect, so food scraps do not easily stick to the surface of the teeth, bacteria do not ferment food scraps and are hydrophobic so they are anti-bacterial. Furthermore, according to Almatsier (2003), fat can function as a lubricant so that bacteria in the mouth do not easily damage tooth tissue, in other words it can prevent dental caries. Research conducted by Kabara (1986), showed a relationship between fat and the occurrence of dental caries.

4. CONCLUSION

The results of this study showed that of the 50 second grade students who were required as respondents, the number of female students was higher than that of male students, namely 26 people or 52%. High school is the level of education most completed by mothers of second grade students, namely 19 people or 38%. As many as 44 people or 88% of second grade students have mothers who do not work or are housewives. The results of this study showed that 66% of second grade students at SDN 01 Ciangsana Ciangsana Village, Bogor Regency had poor nutritional status and 34% of second grade students had normal nutritional status. sufficient food intake. From this proportion, it can be seen that second grade students have a relatively high malnutrition status. 74% of second

grade students at SDN 01 Ciangsana, Ciangsana Village, Bogor Regency suffer from high caries severity. This proportion is higher than students who suffer from caries severity with a low category of 26%.Second-grade students at SDN 01 Ciangsana Ciangsana Village, Bogor Regency, mostly tend to have low levels of carbohydrate, protein and fat consumption, namely 90%, 66% and 88% respectively. While the level of consumption of carbohydrates, protein and fat in good quantities is owned by second grade students respectively by 10%, 34% and 12%. Based on the results of the analysis, it was found that the severity of dental caries and the level of carbohydrate consumption were variables related to the nutritional status of second grade students at SDN 01 Ciangsana Ciangsana Village, Bogor Regency. Based on the results of the analysis, it was found that the level of protein consumption and the level of fat consumption were variables that were not related to the nutritional status of second grade students at SDN 01 Ciangsana, Ciangsana Village, Bogor Regency.

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