

## Biopsychosocial Identification of Early Childhood Caries (Ecc) as a Predictor of Risk Factors of Caries in Pre-School Children

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### Abstract

The American Academy of Pediatric Dentistry (AAPD) defines Early Child Caries (ECC) is the presence of one or more lesions (cavitory or noncavicious lesions), tooth loss (due to caries), or teeth restored in primary teeth in children aged 71 months below. This study aims to examine the relationship between social and behavioral variables and risk factors for Early Childhood Caries in preschool children and play groups in Wajo, South Sulawesi, Indonesia.

In total of 1732 subjejt research children aged 3-5 years old were examined using prevalence (caries percentage). A questionnaire filled directly by the child's parents produced information about social variables and oral health behaviors, and cognitive and socioeconomic factors.

Caries rate in Wajo Regency, South Sulawesi is still quite high (74.1%). Percentage of caries in children who used bottle milk is quiet lareg amounting to 79.1%, children who drankk milk and kept using bottle milk 78.5%, and only consuming breast milk alone caries number only equal to 64,7% .Biopsycosocial statistic data as risk factor to early child caries : History of breast milk (breast milk) / supporting milk drick (breast milk) ( $p < 0.001$ ), the use of milk bottles and breastfeeding frequency ( $p = 0.005$ ), history of children's habits maintaining dental hygiene including age of children starting to brush their teeth and the habit of brushing their teeth before bed ( $p < 0.001$ ), parental education history ( $p < 0.003$ ) about pediatric dental health ( $p = 0.005$ ).

Caries in Wajo Regency, South Sulawesi is still quite high (74.1%). History of breastfeeding / supporting breastfeeding drink, history of children's habits maintaining dental hygiene including age of child initiating tooth brushing and brushing habits of children before bed, parental education history, and mother's knowledge about dental health of children are considered as risk factors of early childhood cariers.

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### Introduction

Dental caries occur due to a localized chemical disintegration of tooth surfaces (enamel and dentine) caused by dental plaque and mediated by changes in salivary acidity.<sup>1</sup> Dental caries is a disease with high incidence rates in children. In deciduous teeth, dental caries is a preventable and reversible disease if handled in

the early stages, but if left untreated it will cause pain, bacteremia, affect facial growth and development, premature tooth loss, speech impairment, increased maintenance costs, loss of confidence, and affect the pattern and direction of permanent dentition.<sup>1,2</sup>

*The American Academy of Pediatric Dentistry (AAPD) defines early childhood caries (ECC) as the presence of one or more lesions (cavitory or noncavicative lesions), tooth loss (due to caries), or teeth restored in primary teeth in children aged 71 months below ".<sup>1,2</sup> The term severe early childhood caries refers to an atypical or progressive or acute or rampant pattern of dental caries. 3-5 years of age, one or*

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more cavities, tooth loss (due to caries), or restored tooth surfaces on the maxillary anterior teeth or combined scores of lesions, tooth loss, or restored teeth  $\geq 4$  (3 years of age)  $\geq 5$  (age 4 years),  $\geq 6$  (age 5 years).<sup>1,2</sup>

The precise term to describe the "early childhood caries" is a condition that reflects a multifactorial etiology process, can also represent all types of caries in preschooled infants and children. ECC has been an epidemic affecting the growth and development patterns of preschoolers and preschoolers worldwide. Comprehensive transmission of ECC shows that the prevalence differs from population to population.<sup>2,3</sup>

In the United States, it was stated that the dominance of child tooth decay was between the ages of 2 to 5 years ie 24.2% between 1988-1994 and increased by about 3% (27.9%) between 1999-2004 according to national health and nutrition examination survey. In developing countries, the prevalence of ECC is estimated to be 1-12% in infants and increased to 85% in underprivileged groups.<sup>4</sup> In Europe, the prevalence at age 3 is about 20%. In Japan in 2007, 2.8% of children aged about 18 months experienced ECC, while 25.9% of children aged 3 years.<sup>5,6</sup>

ECC is a multifactorial disease. As a carious lesion, ECC is caused by poor oral hygiene, bacterial invasion, poor dietary habits, and so on. The presence of enamel damage also affects the formation of lesions, such as hypoplasia known as hypoplasia-associated severe early childhood caries.<sup>3,6,7</sup>

## Materials and methods

### Research Design

This study used a cross-sectional design, with dependent variables and independent variables measured at the same time. This cross-sectional design is considered appropriate to establish risk factors for dental caries. Cross-sectional studies will take measurements of variables at one point in time, to determine whether subjects are exposed/unexposed and dental caries or not dental caries. Afterwards, an intra-oral examination and anamnesis were performed on the child, followed by salivary pH examination to see the salivary acidity of the sample. The diagnosis of dental caries accompanied by the recommendation was

recorded in the status card of early childhood caries.

### Research Participants

The study population were all kindergarten and playgroup in March 2017 to July 2017 in Wajo Regency, South Sulawesi. The number of research subjects was 1732 children aged 3 to 5 years who were willing to follow the dental examination and with the number of mothers the total of 1732 who were also willing to participate. Samples were taken by nonprobability sampling with a saturated sampling technique. Saturated sampling is a technique of determining the sample when all members of the population are used as a sample.

### Statistical Analysis

Furthermore, based on existing data, tabulation of analysis data about dental caries risk model. Data were analyzed using SPSS 16.0. The caries experience was determined using two calculations: deciduous, missing, and restored dental teeth (dmfs) scores, and the number of children with early childhood caries. Analytical research is a study that explores how and why the health phenomenon occurs as well as perform a correlation analysis between risk factors with the effect factors simultaneously.

## Results

This study is based on the characteristics grouped by species of counseling and child sequencing in the family. The following is the profile of the research subjects of parents and students.

Category	N	Percentage
Age		
< 48 months	151	8.7 %
49 months – 60 months	977	56.4 %
60 months – 72 months	604	34.9 %
Sex		
Male	900	52.0 %
Female	832	48.0 %
Order of the children		
First	331	19,1%
Second	807	46,6%
Third	365	21,1%
Fourth and so forth	229	13,2%

**Table 1.** Distribution of respondents by age group.

In Table 1 above, it can be seen the distribution of respondents by age group. Research subjects consisted of under 4 years of age (<48 months) up to 6 years (72 months). The highest number of respondents were in the

49-60 month age group the total of 977 people or 56.4% with male sex with the highest number of 52.0% or as many as 900 people. The age distribution of these respondents indicates more respondents in the TK A class.

Category	N	Percentage
MotherOccupation		
1. Not Working	1557	89.9 %
2. Working	175	10.1 %
Last Education :		
1. No school and Elementary	1158	66.8 %
2. Junior High - Senior High	535	31 %
3. Bachelor-Postgraduate	39	2.2 %
FatherOccupation		
1. Not Working	44	2.5 %
2. Working	1688	97.5 %
Last Education :		
1. No School and Elementary	856	49.4 %
2. Junior High - Senior High	754	43.5 %
3. Bachelor- Postgraduate	122	7.1 %

**Table 2.** Distribution of respondents by education level.

From table 2 above it can be seen that the respondent of a mother with the highest rate of not working amounting to 89.9% or as many as 1557 people, while for respondent of fathers who does not work are only 2.5% or as many as 44 people. For the mother education level, the group of no school and only the primary school graduates have the highest percentage of 66.8% or as many as 1158 people. Similarly, for the education level of fathers, no school group and only elementary school graduates have the largest percentage of 49.4. This illustrates the level of education in GanraSubdistrict that men generally work even with low education level. Because of their average work in agriculture (farming).

### Dental Examination Results

Assessment of caries status in school children was done by holding a dental examination at a specified location simultaneously. The examination was conducted by involving 30 dentists who had followed the perception of format and assessment system, 10 young doctors and assisted by several dental nurses. The determination of caries existence was using ICDAS-II standards including the presence of carious lesions even though cavities have not yet appeared.

The results obtained found as many as 1284 children (74.1%) with caries teeth and only 447 children (25.9%) whose teeth were not diagnosed with caries. This shows that caries rates in the Wajo district city area are still quite high. This caries number is similar to the general

caries rate of children in Indonesia that is 70%.

### Results of Cross Tabulation Between Feeding / Drinking History And Eating Habits With Caries Status

From the results of dental examination data obtained on the status of caries in children who then carried out cross-tabulated with historical data of breastfeeding and eating habits obtained through data collection using questionnaire instrument, it can be seen the results in table 3 and table 4.

From the results we can see caries based on the history of exclusive breastfeeding or breast milk accompanied by companion drink, breast milk using bottles or not and how long to drink breast milk. In addition, it can be seen that existing caries based on whether the child when using a bottle to fall asleep, the frequency of how many times and whether there is an addition of sugar or not in the supporting drink/breast milk substitute. More details can be seen in table 3 below.

Category	No Caries	Caries	Total
Breastfeeding History			
Exclusive breastfeeding			
Breastfeeding + Bottled Milk	195 (35.3%)	355 (64.7%)	550
Milk	204 (21.5%)	745 (78.5%)	949
Milk Bottle Only	49 (20.1%)	184 (79.1%)	233
Period of Drinking Breastfeeding			
< 12 months	336 (26.3%)	944 (73.7%)	1280
> 12 months	112 (24.7)	340 (75.3%)	452
Using Bottle to Sleep			
Always	102 (20.2%)	404 (79.8%)	506
Never / Sometimes	345 (28.2%)	881 (71.8%)	1226
Frequency of Drinking Milk			
< 3 times a day	292 (26.1%)	827 (73.9%)	1119
> 4 times a day	156 (25.4%)	457 (74.6%)	613
Addition of sugar to milk			
Yes	156 (21.5%)	569 (78.5%)	725
No	292 (29.0%)	715 (71%)	1007

**Table 3.** The percentage of caries in children.

In table 3 it shows that the percentage of caries in children who drink only using bottle milk is quite big amounting to 79.1%. Although not much different from children who drink breast milk but also continue to use bottle milk is 78.5%. Unlike the only consuming breast milk alone, the caries number is only 64.7%. Sugar contained in milk is a type of lactose, which is a combination of two types of simple sugars namely glucose and galactose. Lactose contained in milk will be converted by microorganisms to lactic acid with a pH of 5.5 which is a critical pH that can accelerate the occurrence of dental caries.

Children who drink breast milk with a maturity of fewer than 12 months had a greater

number than children who drink breast milk for more than 12 months, with caries rates found to be greater in the group taking longer breastfeeding over 12 months with caries rates of 75.2%. When children use bottles at night to fall asleep caries is found in the group of children who always use bottles to fall asleep by 79.8%. When the child is asleep, saliva flow will significantly decrease and this condition will be followed by the flooding of acid produced by fermentation of sugar contained in the bottle-containing milk in the oral cavity thus it will accelerate the formation of dental caries.

Children who drink milk less than 3 times a day more than children who drink milk more than 4 times a day. For children with a frequency of drinking milk more than 4 times showed caries number 74.6% but did not show much difference with children who only had 3 times drinking milk amounting to 73.9%. While for the addition of sugar in milk amounted to 78.5% of children experiencing caries, but not much different from the group that did not have an addition of sugar in milk, that is equal to 71%. This is because sugar contains sucrose which is a type of disaccharide of the simplex.

The results of this dental examination are also conducting cross tabulation with children eating habits. Caries occurrence can be seen based on the frequency of eating candy/chocolate, the frequency of eating cakes / sweet snacks, the habit of eating foods sereta eating vegetables or not. For more details, it can be seen in table 4 below.

Category	No Caries	Caries	Total
Habit of eating candy			
Once or twice a day	287 (38,6%)	457 (61,4%)	744
Twice or more	141 (14,3%)	847 (85,7%)	988
Habit of eating cakes/ sweet snacks			
Once or twice a day	131 (36%)	234 (64%)	365
Twice or more	316 (23,1%)	1051 (76,9%)	1367
Habit of Food Snack			
Yes	126 (18,4%)	560 (81,6%)	686
No	321 (30,7%)	725 (69,3%)	1046
Habit of eating vegetables			
Yes	253 (29,7%)	598 (70,3%)	851
No	195 (22,1%)	686 (77,9%)	881

**Table 4.** History of Eating Habits.

From table 4 it can be seen that the number of children who have the habit of eating candies twice or more has the highest caries that is equal to 85.7% compared with children who eat candy only once or even never, that is equal to 61.4%. In children with the habit of eating

cakes/sweet snacks with a frequency of twice or more also have a high incidence of caries which is equal to 76.9% compared with children with eating habits / sweet snacks once a day or even never that is equal to 64%.

No.	Question	Answer
1	Does your child brush teeth in the morning? 1. Yes 2. No 3. Sometimes	1051 263 418
2	Does your child brush teeth at night before bed? 1. Yes 2. No 3. Sometimes	603 696 433
3	Does your child use toothpaste when brushing teeth? 1. Yes 2. No 3. Sometimes	1027 287 418
4	Does your child brush teeth after eating sweet foods? 1. Yes 2. No 3. Sometimes	112 1391 229
5	Does your child brush teeth by themselves? 1. Yes 2. Assisted by parents 3. Both	939 608 185
6	Does your child gargle water after eating and drinking sweets? 1. Yes 2. No 3. Sometimes	170 1304 258
7	Has your child ever rejecting to eat due to a toothache? 1. Yes 2. No 3. Sometimes	963 307 462
8	Have you ever brought your child to check-up their teeth to dentists? 1. Yes 2. Never	49 1683
9	Have you ever brought you child to a public health to check-up their teeth? 1. Yes 2. Never	68 1664
10	Have you ever checked to a doctor in regards to your child's teeth condition to a public health/ dentist in the last six months? 1. Yes 2. Never	58 1674

**Table 5.** Behavior of Maintaining Children Dental Health.

The frequency of consumption of cariogenic foods contributes greatly to the cause

of dental caries and other problems. This is because food and beverages containing sugar will lower the plaque pH quickly to levels that can cause demineralization of the enamel. The plaque will remain acidic for some time. To return to normal pH around 7, it takes 30-60 minutes. Therefore, frequent and repeated sugar consumption will retain plaque pH under normal circumstances and lead to demineralization of enamel.

The habit of eating foods also appears to cause considerable caries that is 81% compared with children who do not snack their food. Children who do not like to eat vegetables showed caries rate of 77.9% compared to children who used to consume vegetables that is equal to 70.3%. This can be caused by eating fruits and vegetables rich in vitamins, minerals, fiber, and water can launch self-cleansing on the teeth, so plaque can be reduced and ultimately dental caries can be prevented.

For the next table, it will show how the overview of the child's behavior in maintaining healthy teeth viewed from the habit of brushing, using toothpaste and gargling after eating sweet foods/drinks. More details can be seen in table 5.

Based on table 5, it shows that these early childhood respondents already have a good habit of brushing their teeth in the morning, using toothpaste and brushing their teeth. For the habit of brushing teeth at night before bed is still a lot of children who do not do it. This may be due to the lack of knowledge of children about the right time to do cleaning teeth in maintaining healthy teeth and mouth. In addition, the importance of parenting role in maintaining healthy teeth of children is also indispensable. Similarly, in the case of brushing and drinking water after consuming sweet foods and drinks, in general, has not been done.

In terms of the behavior of visiting health facilities, it turns out that almost all respondents answered never took their children to the nearest health center or dentist to get dental health services even though only limited to check the condition of his child's teeth every 6 months once. This point must certainly get attention because children should be accustomed to performing dental checks every 6 months that can be done at the nearest health center or to the family dentist. Most likely this does not get the attention of parents because of the assumption that the child's milk teeth when the problem is not

something that needs to be followed up because people still think that these milk teeth will also be replaced by permanent teeth.

Table 6 below is the maternal knowledge distribution of dental hygiene. In this table, it can be seen some questions about the teeth growth of children and efforts to prevent cavities in early childhood.

No.	Question	Correct Answer	Wrong Answer
1	Milk tooth seeds begin to form when the baby in the womb aged 1 ½ 2 months	146	1586
2	Adult teeth or permanent teeth begin to be formed at 8-9 months of gestation	117	1615
3	At the age of 2 ½ - 3 years of milk teeth is complete as many as 20 pieces	258	1474
4	The mandibular first molars grow at the age of 6-7 years	316	1416
5	The number of milk teeth is as many as 20 pieces while permanent teeth are 32 pieces	336	1396
6	The mandibular first series teeth grow at 7-8 years of age	219	1513
7	The maxillary canine teeth grow at the age of 9-10 years	214	1518
8	The large third molars of the maxilla and lower jaws grow at the age of 17-21 years	126	1606
9	The mandibular first series teeth start to shake at 12-14 months of age	151	1581
10	The mandibular first molars begin to grow at the age of 14-16 months	126	1606
11	It is necessary to do dental examination on pregnant mother in health service facility/dentist	467	1265
12	Porpus teeth are marked with a blackish brown hole	1051	681
13	Tooth decay can be detected by direct observation of the teeth	1435	297
14	Hollow teeth due to lazy brushing teeth	1669	63
15	Tooth decay can be caused by drinking sweet milk	1533	199
16	Drinking milk with bottles at risk of cavities Chewing food for a long time in the mouth (eating food) can cause cavities	1382	350
17	Chewing food for a long time in the mouth (eating food) can cause cavities	905	827
18	Milk teeth cause the child does not eat appetite	963	769
19	Dental perforated teeth can disrupt the growth of the child	365	1367
20	Milk teeth affect the child's intelligence	282	1450
21	Milk teeth lead to permanent tooth growth	341	1391
22	Dental cavities can be prevented	623	1109
23	Need to check the teeth to the dentist / puskesmas when a toothache	1260	472
24	Filling of a child's tooth can prevent more severe damage	438	1294
25	Brushing your teeth at night after drinking milk (before bed) can prevent cavities	1406	326

**Table 6.** Mother's Knowledge of Dental Health Care.

In table 6, regarding maternal knowledge about dental health care, it can be seen that most respondents answered wrong about the age of teething and dental growth.

This shows that most parents are less concerned about the development and growth of their child's teeth. For the prevention of cavities, some respondents answered incorrectly, while most respondents answered correctly to brush their teeth at night after drinking milk can prevent cavities, this may occur due to the lack of information known to parents about how to

maintain oral health of children who should be an important concern.

To determine risk factors associated with early childhood caries, multiple linear regression statistic analyzes were used to control biopsychosocial, birth history indicators, dentist visit history, oral hygiene habits (age of tooth brushing, daily brushing, brushing before bedtime; control of tooth brushing by parents, using toothpaste), nutritional factors (history of drinking bottled milk, number of snacks, time to eat). The results show that the history of breastfeeding/compulsory breastfeeding (breast milk), the use of milk bottles and the frequency of breastfeeding, children's habits maintaining dental hygiene including age of children starting to brush teeth and brushing habits before bed, history of the parents' education and mother's knowledge are statistically related to early childhood caries.

The study also emphasized the importance of maintaining oral hygiene after deciduous first deciduous teeth to prevent dental caries. The results of this study indicate that children who start brushing their teeth at the first deciduous teeth eruption have less damaged tooth surfaces than children who start brushing later ( $p = 0.009$ ) and children without brushing before bed has more broken tooth surfaces compared to children who brushed their teeth before bed ( $p = 0.013$ ).

## Discussion

From the result of the research, the subjects consisted of children under 4 years (<48 months) up to 6 years (72 months) with the highest number of respondents were in the age group of 49 - 60 months ie 977 people or 56.4% with the largest number of male equal to 52.0%. For the parents of the respondents, it was found that more maternal respondents were unemployed than the father respondents.<sup>3,4</sup> For the education level of the mothers, the non-school group and only the primary school graduates had the largest percentage of 66.8%. Similarly, for the education level of the father, SD has the largest percentage of 49.4%. Maternal education level is also evaluated as a risk factor of ECC.<sup>3,5</sup> The result of research conducted by Nahid AA shows a significant relationship between maternal education level and ECC. The results show that ECC is significantly higher in children with low maternal education levels.<sup>3,6</sup>

Results obtained in this study were found as many as 1284 children (74.1%) with caries-diagnosed teeth and only 447 children (25.9%) whose teeth were not diagnosed with caries. The results of this study are in line with research conducted by Nahid AA in 2013 with a sample of children aged 1-3.5 years in Tanta showed that of 560 children examined, 390 suffered dental caries with a prevalence of 69.6%. Thus, 30.4% of children were classified caries-free (without clinical lesion manifestations) in primary teeth.<sup>3,7</sup>

However, this result is inconsistent with a prevalence of 26.5% among children in Saudi Arabia<sup>2</sup> and which has a 40% prevalence among children aged 0-5 in Brazil<sup>3,8</sup>. In addition, the prevalence of this study is estimated to be in line with the oral health survey studies of preschool children in Malaysia showing caries prevalence of 76.2% and 74.5% respectively in 2007 and 2009.<sup>6,9</sup>

The difference in caries prevalence is associated with the fact that the etiology of ECC is complicated and there are some unexplained interactions. In addition, it may be due to knowledge, attitudes, and bad practices on factors related to ECC in different populations. In addition, the lack of an organized preventive oral health care system, limited accessibility to prevention and treatment services and insufficient scientific knowledge may have a role.<sup>10</sup>

Based on the history of breastfeeding and substitute drinks/compulsory breast milk, caries rate in children who drank only using bottle milk is quite large that is 79.1%. Although not much different from children who drink milk also continue to use bottled milk. In contrast to those who only consume breast milk alone, with the lowest caries rates among the three. Meanwhile, children who use bottles at night to fall asleep, caries rate was found at 79.8%. This is in line with research conducted by Ghaita et al in 2017 which shows that a higher caries index is found in children who use bottle feed compared to children who do not use bottled milk.<sup>7,11</sup>

In addition, it is also supported by research conducted by Ozer S and Cogulu D in 2011 who reported that drinking milk and bottle milk is a risk factor for ECC Based on the history of breastfeeding and substitute drinks/compulsory breast milk, caries rate in children who drank only using bottle milk is quite large that is 79.1%. However, this is not in line

with research conducted by Sabbah WA in 2003 who reported that breastfeeding patterns do not show any association with the occurrence of ECC.<sup>8,13</sup>

The study reported that breastfed drinking has a role in preventing colonization of *Streptococcus mutans* bacteria. The difference from these results may be due to there is a difference in the level of maternal care with the habits of keeping the mouth of their children, the level of knowledge of the mother, and genetics in different populations. Drinking milk by bottle until falling asleep is not well done. This is because the liquid milk will pool in the oral cavity within a few hours. A puddle of milk in the oral cavity when the child is asleep will be the substrate to be fermented by the bacteria to become acidic with plaque pH being below 5 within 1-3 minutes. The longer and often the child consumes bottled milk, the possibility for the occurrence of caries higher.<sup>8,14</sup>

Children who have a habit of eating candies twice or more have the highest caries number of 85.7% compared with children who eat candies only once or never. In addition, children with the habit of eating cakes / sweet snacks with twice or more frequencies also have a high incidence of caries that is equal to 76.9% compared with children with eating habits / sweet snacks one time a day or even never. This is in line with research conducted by Rosidi et al (2013), which shows that the incidence of caries is higher in children with high cariogenic dietary intake such as candy, chocolate, cake and ice cream that is 95%.<sup>11,15</sup>

Cariogenic foods are foods that can cause the occurrence of caries. The nature of cariogenic foods is a lot of carbohydrates, sticky and easily destroyed in the mouth. The relationship between carbohydrate consumption and the occurrence of dental caries has something to do with plaque formation on the tooth surface. Plaque formed from food remains attached to between the teeth and in this plaque will eventually overgrown with bacteria that can change glucose into acid thus the pH of the oral cavity decreases to 4.5. In such circumstances, the enamel structure of the tooth will dissolve. In addition, the frequency of dietary cariogenic consumption is also one of the significant contributors to dietary diets.<sup>12</sup>

The acid formed from food will decrease the pH of the oral cavity so that the acid

atmosphere occurs so that there will be demineralization process which will cause the enamel to lose the crystallization ion so that the exposure of teeth is very high. The high frequency of dietary cariogenic consumption will lead to more demineralization processes than remineralization. This imbalance will cause caries.<sup>12,16,17,18</sup>

Early childhood in this study already has a good habit in the case of morning brushing, using toothpaste and brushing teeth. For the habit of brushing teeth at night before bed is still a lot of children who do not do it. Similarly, in the case of brushing and drinking water after consuming sweet foods and drinks, in general, has not been done. This result is supported by research conducted by Ningsih et al, who found that most samples had good habits in morning brushing and almost all samples never brushed after consuming sweet foods and drinks.<sup>13,15,19</sup>

Tooth brushing is one of the most important things in the process of dental caries. Good brushing quality (brushing teeth in the right way and the way it should be done) will improve the effectiveness of the brushing procedure. Tooth brushing with fluoride-containing toothpaste is an addition in the prevention of dental caries. The child's teeth cleavage begins since the eruption of the child's first tooth and the way who found that most samples had good habits in morning brushing and almost all samples never brushed after consuming sweet foods and drinks.<sup>13,16,20</sup>

Brushing of the teeth of the child begins since the eruption of the child's first tooth and the way tooth brushing should be established when the milk molar has erupted tooth brushing should be established when the milk molar has erupted. Children should perform three times a day of brushing teeth immediately after meals and before bedtime. It has been shown that dental plaque acid will drop from normal pH until it reaches pH 5 within 3-5 minutes after eating carbohydrate-containing foods. Brushing teeth can speed up the pH 5 rising process to normal (6-7) so as to prevent the process of caries formation.<sup>21,22</sup>

In terms of visiting health service facilities, almost all respondents answered that they never brought their children to the nearest puskesmas or dentist to get dental health services even though only to check their child's dental condition once every 6 months. This is in line with the

research undertaken by Widayati which shows that most of the parents' behavior in the oral and dental examinations of children is lacking. This may be due to the lack of information and awareness in performing routine dental and oral examinations once every 6 months, and the first tooth and mouth examination should be performed from the first tooth or at the age of 1 year.<sup>23</sup>

In addition, it is also supported by research conducted by Do Minh H et al in Vietnam in 2017 who reported that most children never visited a dentist. In the study it was found that children who visited dentists regularly had 0.12 more dental surfaces were damaged than children who visited dentists when there was a problem, and had 0.23 more damaged tooth surfaces than children who had never visited the dentist.<sup>24</sup>

Mother's knowledge about dental health is very important because it is an important factor in influencing the health and dental disease of children. Maternal knowledge is also based on factors such as work, education level, parenting experience, residence environment and economic status.<sup>14</sup>

In a study conducted by Nahid AA, 2013, a mother's habit to keep her mouth clean and her child is one of the risk factors of dental caries. This is because the mother has an important role in maintaining health for children who usually can not brush their own teeth and depend on the nanny.<sup>25</sup>

Dental brushing skills should be taught and emphasized in children at any age. Children under the age of 5 years cannot maintain proper oral hygiene and effective then the parent should do the brushing of the child's teeth at least until the child is 6 years old then supervise this procedure continuously. For children under the age of 5 years, efforts to do primary prevention given to the mother such as improving mother's knowledge about maintaining child's oral hygiene, good and correct child feeding patterns and child protection measures that can be given.

This is due to the limited ability of the child and the child is closer to his mother. In children aged 6 years and over, dentists should emphasize more on the child about his responsibility to maintain oral health.<sup>17</sup> Mother becomes a major determinant that can affect the oral health of the child both in the short and long term.

## Conclusions

The prevalence of early age caries in preschool children in Wajo Regency, South Sulawesi is still high, at 74.1%. To determine risk factors associated with early childhood caries, multiple linear regression statistic analyzes were used to control biopsychosocial, birth history indicators, dental visit history, oral hygiene habits of children. The results showed that history of breastfeeding/compulsory breast milk (breast milk) ( $p < 0.001$ ), use of milk bottles and breastfeeding frequency ( $p = 0.005$ ), history of children's habits maintaining dental hygiene including age of child initiating brushing teeth and ( $p < 0.003$ ), and mother's knowledge about dental hygiene ( $p = 0.005$ ) were statistically related to early childhood caries. The results of this study also showed that children who start brushing their teeth at the first deciduous teeth eruption have less damaged tooth surfaces than children who start brushing later ( $p = 0.005$ ) and children without brushing their teeth before bed have more tooth surfaces that are damaged than children who brush their teeth before going to sleep ( $p = 0.017$ ).

## Declaration of Interest

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