ORIGINAL ARTICLE

Parental Behaviors and Feeding Practices Influencing Early Childhood Caries at a Public Hospital in Selangor

Darwina Madilla Mohamed [1], Roslinda Isa [2]*, Rosuzeita Fauzi [2], and Siti Nor Ismalina Isa [3]

[1] Hospital Sungai Buloh, Jalan Hospital, 47000 Sungai Buloh, Selangor, Malaysia
[2] Centre of Nursing Studies, Faculty of Health Sciences, Universiti Teknologi MARA, Cawangan Selangor Kampus Puncak Alam, 42300 Kuala Selangor, Selangor, Malaysia
[3] Department of Basic Sciences, Faculty of Health Sciences Universiti Teknologi MARA Selangor, 42300 Puncak Alam, Malaysia

ABSTRACT

Introduction: Early childhood caries (ECC) dental caries is preventable, recent global data indicate that oral health has not improved in the last 25 years. Parents' practices regarding child oral health behaviour and infant feeding practices can impact the development of ECC. **Purpose:** To determine the factors influencing the development of early childhood caries in Hospital Sungai Buloh, Selangor. **Method**: A cross-sectional study was conducted among parents of children aged below six years old admitted to Paediatric ward, Hospital Sungai Buloh. Using a random sampling method, 181 parents were involved in this study. A structured questionnaire was used to obtain the sociodemographic characteristics, parents' report on child oral health behaviour, and infant feeding profile. **Result:** The prevalence of ECC among children admitted in Paediatric ward 7A was 50.3%. A significant association was only noted between parents' time to brush their child`s teeth and their ECC condition ($p < 0.05$). **Conclusions:** More effective prevention and management methods through a deeper investigation of the various factors impacting the prevalence of ECC in Malaysian communities is required to reduce the prevalence ECC.
Malaysian Journal of Medicine and Health Sciences (2025) 21(SUPP5): 72–81. doi:10.47836/mjmhs.21.s5.10

Keywords: ECC, Infant feeding practices, Oral Healthcare, Parents Behaviour.

Corresponding Author:
Roslinda Isa, Msc
Email: roslindaisa@uitm.edu.my
Tel: +603- 3258 4885

INTRODUCTION

American Academy Paediatric Dentistry (1) define early childhood caries (ECC) as the existence of one or more decaying missing or filled tooth surfaces in any primary tooth in a child under the age of six. Baby bottle tooth, nursing caries, and nursing bottle syndrome are the terms used to call ECC with multi-factorial diseases (1). The ECC occurs when acidogenic microorganisms in dental plaque metabolize the fermentable carbohydrates on the tooth surfaces, causing an acidic environment in the mouth (2). Any indication of smooth surface caries in children younger than three years old can be diagnosed with severe ECC (3).

ECC is found worldwide, but it is expanding significantly in low- and middle-income nations (4). Probably half of preschoolers suffer from early childhood caries, a global health issue, results from 29 of 195 countries have been reported, ECC prevalence has risen greatly (5). The disease affects between 36% to 85% of three years olds children in Asia, particularly in the Far East region. In India, the prevalence has been estimated to be between 44% to 49% among eight months old children to four years old children (3). The Fourth National Oral Health Survey carried out in Mainland China indicates a 5.9% increase in the prevalence of caries among five-year-old children in their primary teeth compared to a decade prior, reaching a total of 71.9% (4).

ECC is one of the most common persistent paediatric problems due to several factors, including biological and nutritional factors and parental social influences (1). If untreated, early childhood caries progresses to a more severe form of illness, resulting in malocclusions, abscesses, and pain and the consequence of extensive waiting lists for hospital surgical treatment (6). Poor oral health can also have a significant impact on quality of life and daily functioning for children. They may endure discomfort from dental issues such as pain, dental abscesses, challenges with chewing and swallowing, feelings of self-consciousness about their teeth's appearance or absence, as well as tooth decay or discoloration (7). Furthermore, parents may experience mental stress related to societal financial burdens, particularly when dealing with expenses for treatments involving surgery, general anaesthesia and overall

healthcare costs (8).

Untreated early childhood caries remains widespread and poses a significant financial, social and medical burden on global public health (4). There were 443 to 622 million cases of untreated caries in primary teeth worldwide (4). ECC has several negative effects such as an increased chance of developing new caries lesions in both the primary and permanent dentition (set of 32 adult teeth that replace primary teeth), frequent hospitalizations and emergency department visits, high treatment expenses, missed school days and a lower quality of life in terms of oral health (4). ECC is one of the most common public health issues, affecting both deciduous and permanent teeth, initiation in managing dental caries in young children, particularly those with rapid advancement, can be a challenge for dental professionals (9). Thus, this study was done to determine the factors influencing the development of early childhood caries in Hospital Sungai Buloh, Selangor.

MATERIALS AND METHODS

Study design and population

A cross-sectional study was conducted at ward 7A (Paediatric/Oral Maxilla Facial Dental surgery (OMFS)/ Dental), Hospital Sungai Buloh (HSB).

Samples

The population size (N) is 340, based on the total annual admissions of children diagnosed with early childhood caries in Paediatric ward of Hospital Sungai Buloh in 2021. Using Raosoft, the sample size was calculated with a 5% margin of error, a 95% confidence interval, and a 50% response distribution, resulting in a recommended sample size of n = 181 for this study. By using simple random sampling, parents who fulfilled the inclusion criteria were recruited: parents are citizens, parents whose child has been admitted to Paediatric Ward and parents who can read and write in Bahasa Malaysia and English. Exclusion criteria included parents below the aged of 18 years old, parents of child with chronic diseases (congenital heart disease, epilepsy and others) and if the child aged above six years old.

Instruments

A structured item questionnaire was adapted from Folayan et al. (10). Data collection has been done on the participants including sociodemographic characteristics, oral health behaviours and infant feeding profile. This adapted questionnaire came in English version. The questionnaire was then distributed in both English and Malay language after the translation process was done by the expert translator.

The questionnaire consisted of three parts which are Section A (sociodemographic data), consisting of 10 questions for data child's and parents' background. Section B questionnaire on oral health behaviour was adapted from Folayan et al. (10) consist of 11 questions. The questions were on tooth brushing frequency, use of fluoridated toothpaste, and consumption of sugary snacks between main meals. These questions offered four to seven response options. The following cutoff points were used to define acceptable levels for each component: brushing more than once a day, using fluoridated toothpaste always or almost always, and consuming sugary snacks between main meals less than once a day.

Section C focused on infant feeding profiles and consisted of 11 closed-ended questions. This questionnaire was chosen because it provides valuable insights into the feeding practices and dietary habits of young children, which are crucial factors influencing oral health and overall well-being. Seven of the questions were dichotomous (yes/no), while the other three were closed-ended with responses scored on a scale from 1 to 6. A score of 88 was assigned for "don't remember," and 9 or 99 indicated "no response."

Validity of the Questionnaire

The researcher completed the forward translation, and the draft was reviewed by three paediatric experts. They checked the sentence structure and replaced words and phrases unsuitable for the Malaysian context. After revisions were made, the updated version was sent back to the experts for confirmation. The translated content was then given to a linguistic expert for backward translation. A panel of three experts, including a paediatric lecturer, a nurse manager, and paediatric nurses, assessed the content validity of the questionnaire.

To ensure the content's appropriateness, a content validity index (CVI) was done. The questionnaire has been distributed to 10 experts including one nursing lecturer, five dentists, two ward managers, one medical officer, and one senior staff nurse to ensure accuracy, clarity, and suitability of understanding, and comments about the questions. After that, a recheck and improvement were made. The result from the content value index (CVI) result was 0.8 and acceptable (11).

Data Collection

Data collection begins after obtained approval from the Research Ethics Committee (REC) of the Universiti Teknologi MARA (UiTM) and National Medical Research Registry (NMRR). Head of department and ward manager has been approached and explained that research needed to be conduct in Ward 7A HSB, a copy approval letter Research Ethics Committee (REC) UiTM and National Medical Research Registry (NMRR) submitted to HOD and ward manager for references. The data collection begins once approval granted. Participants in this study are voluntary. The participants have been given consent before answering the survey questions. Those who agreed to participate in this study, they have been asked to answer the questionnaire

provided. The researcher recruited participants who agreed to participate in this study. The questionnaire was administered face-to-face, with participants taking about 30 minutes to complete it. Upon completion, the questionnaires were immediately returned to the researcher.

Ethical Approval and Authority Permission

Ethical approval from the Research Ethics Committee (REC) of the Universiti Teknologi MARA (UiTM) was obtained on 8th April 2023 (FERC/FSK/MR/2023/0079). Besides that, ethical approval from National Medical Research Registry (NMRR) has been obtained on 6th June 2023 (NMRR ID-23-00967-KD6). Before answering the questionnaire, information regarding this study was given as participant information sheet. A consent form was attached, and participants could proceed with the questionnaire if they agreed to take part.

Statistical Analysis

Data analysis Using SPSS version 28, socio-demographic data were analysed through descriptive analysis. To identify oral health behaviour and determine of infant feeding profile among children in HSB, descriptive analysis has been used. Chi-square tests and fisher exact tests have been used to determine the association between health behaviour and feeding profile with ECC and non-ECC in HSB. There was a significant correlation between variables if the $p < 0.05$.

RESULTS

Socio-Demographic Characteristics

Table I shows majority of the children in this study were boys 65.7% while girls 34.3%. Their median age was 4 years old, with a range of 1 to 6 years. Most of the children involved were the second eldest siblings. The median age of their caregivers was 34 years old, with a range of 35 to 56 years.

Table II shows almost all the parents (99.4%) were married. 42.0% of the parents completed secondary school. Majority of the parents (66.3%) are government employees.

Prevalence of the early childhood caries

Table III showed the prevalence of early childhood caries (ECC) in Hospital Sungai Buloh was 50.3% as compared to the non-early childhood caries which recorded slightly lower with 49.7%.

Parent's Behaviour on Child Oral health behaviour

Table IV show behaviour toward their child's oral health, indicates most of the parents cleaned their child`s teeth at least twice a day (43.09%). Usually, the child brushes their teeth in the morning before breakfast (33.70%). Almost half of the children cleaned their teeth (49.72%). They typically brushed their child's teeth using a toothbrush (90.06%). In terms of applying toothpaste containing fluoride when brushing their child's teeth, 33.70% said they always do. More than 70% of parents stated that they never floss their child's teeth. Most of the parents did not allow their child to eat sugary snacks or drinks between meals (60.77%). Majority of the parent report that they have never taken their child to see a dentist (68.51%).

Table I: Children's Demographic Characteristics

Variables	Frequency (n, %)
Gender	
Boy	119 (65.7)
Girl	62 (34.3)
Age	
1	4 (2.2)
2	31 (17.1)
3	48 (26.5)
4	29 (16.0)
5	34 (18.8)
6	35 (19.3)
Position of the child in siblings	
1	43 (23.8)
2	79 (43.6)
3	34 (18.8)
4	21 (11.6)
5	4 (2.2)
Child`s education	
Preschool	30 (16.6)
Kindergarten	66 (36.5)
None	85 (47.0)
Child's main caretaker	
Mother	158 (87.3)
Father	19 (10.5)
Other (Grandmother)	4 (2.2)

Table II: Parent's Demographic Characteristics

Variables	Frequency (n, %)
Parent's marital status	
Married	180 (99.4)
Unmarried	1 (0.6)
Widow/widower	0 (0)
Number of children in the family	
1	33 (18.2)
2	60 (33.1)
3	52 (28.7)
4	19 (10.5)
5	15 (8.3)
6	2 (1.1)
Caretaker's education level	
Primary school	5 (2.8)
Secondary school	76 (42.0)
Diploma	72 (39.8)
Degree	28 (15.5)
Occupation of the caretaker	
Government servant	120 (66.3)
Self-employee/Private sector	45 (24.9)
Housewife	16 (8.8)

Table III: The prevalence of the early childhood caries in Hospital Sungai Buloh

Variables	Frequency (n, %)
Early childhood caries	91 (50.3%)
Non-early childhood caries	90 (49.7%)

Table IV: Parents Behaviour on Child Oral Health

Items	Frequency (n, %)
How often do you usually brush you child teeth?	
Irregularly or never	13 (7.18)
Once a week	17 (9.39)
A few (2-3 times a week)	3 (1.66)
Once a day	58 (32.04)
Twice a day	78 (43.09)
More than twice a day	12 (6.63)
When do child brush their teeth?	
Morning before breakfast	61 (33.70)
Morning after breakfast	23 (12.71)
Afternoon before lunch	2 (1.10)
Afternoon after lunch	0 (0)
Evening before dinner	1 (0.55)
Evening after dinner	4 (2.21)
No regular time intervals	39 (21.55)
Before breakfast and before dinner	31 (17.13)
After breakfast and after dinner	9 (4.97)
Before breakfast and after dinner	11 (6.08)
Who brushes child teeth?	
His/herself	90 (49.72)
Caretaker brush everyday	77 (42.54)
Caretaker brush once a week	3 (1.66)
Caretaker brush occasionally	11 (6.08)
What do you use to brush your child`s teeth	
Toothbrush	163 (90.06)
Chewing stick	1 (0.55)
Salt	3 (1.66)
Cotton wool	3 (1.66)
Cloth	11 (6.08)
How often do you use toothpaste containing fluoride when brushing child teeth?	
Always	61 (33.70)
Quite often	17 (9.39)
Seldom	50 (27.62)
Not at all	53 (29.28)
How often do you ask your child to use mouth rinse?	
Always	5 (2.76)
Quite often	10 (5.52)
Seldom	35 (19.34)
Never	131 (72.38)
How often do you use topical fluoride for your child?	
Always	31 (17.13)
Quite often	4 (2.21)
Seldom	50 (27.62)
Never	96 (53.04)
How often do you floss your child teeth?	
Always	8 (4.42)
Quite often	2 (1.10)
Seldom	31 (17.13)
How often do you allow your child to eat sugar-containing snack/drinks between his/her main meal?	
About 3 times a day or more	12 (6.63)
About twice a day	6 (3.31)
About once a day	24 (13.26)
Occasionally, not everyday	110 (60.77)
Rarely or never between meals	29 (16.02)
Never	140 (77.35)
What do you do for your child last dental-check-up?	
I go to dentist	63 (34.81)
I ask for my colleagues to do it for me	1 (0.55)
I do it myself	25 (13.81)
I have access to the school dentist	17 (9.39)
There is no need for a dental check-up	75 (41.44)
When was your child dental check-up?	
Within last 6 months	23 (12.71)
More than 6 months to one year ago	31 (17.13)
More than 1 to 2 years ago	2 (1.10)
More than 2-5 years ago	1 (0.55)
Never	124 (68.51)

Infant's Feeding Profiles

Table V show majority of the parents nurse (98.34%) and breastfeed (93.93%) their children from birth. Almost 60% of the children were given water for the first time after the age of 4 months and above. After 6 months of age, almost all children (88.40%) were fed solid food. Majority of mother breastfed their child at night (92.82%) and did not leave the nipple in the infant's mouth while sleeping (76.80%). 93.37% of parents used a feeder to feed their child. More than 70% parents bottle-fed their kid at night and did not leave their child's bottle in their mouth when fell asleep (70%).

Association between Oral health behaviours and infant Feeding Profiles with ECC and non ECC in Hospital Sungai Buloh

Table VI show only time to brush their child's teeth has a significant association between Non-ECC and ECC with p=<0.05. The results show that ECC outperforms Non ECC in terms of time spent brushing teeth after meals, and both before and after meals. Otherwise, the non-ECC has exceeded the ECC outcome for time brushing their teeth before taking their meals. However, other associations between parents' reports on child oral health behaviours and ECC or non-ECC status did not demonstrate any significant relationships. Similarly, no significant association was observed between infant feeding profiles and ECC or non-ECC status among children in Hospital Sungai Buloh ($p > 0.05$) (**Table VII**).

DISCUSSION

The Prevalence of ECC in Hospital Sungai Buloh

The Ministry of Health (MOH) in Malaysia reported that almost 73% of preschool children in this country have dental caries (12). In this study, it was observed that boys exhibited a higher prevalence of early childhood caries (ECC) at 65.7% compared to girls at 34.3%. However, another study indicated a slight variance in ECC prevalence between girls (60%) and boys (52%) (13).

Nevertheless, the prevalence of boys was higher (58.9%) whereas girls 41.1% (8). This could be a factor of boys are more inclined to overlook their dental health and practice poor oral hygiene routines compared to girls (14). However, there is no evidence to suggest that boys and girls have different saliva compositions or dental structures that could result in ECC (15).

Table V: Infant Feeding Profile

Items	Frequency(n,%)
Did you nurse the child from birth?	
Yes	178 (98.34)
No	3 (1.66)
Did you breastfeed the child?	
Yes	170 (93.92)
No	11 (6.08)
How long did you breastfeed the child?	
Less than 1 month	23 (12.71)
Less than 4 months	16 (8.84)
4-6 months	21 (11.60)
6-12 months	35 (19.34)
12-18 months	20 (11.05)
18-24 months	32 (17.68)
More than 24 months	34 (18.78)
When did you first give water to the child?	
At birth	18 (9.94)
Within 1 week of birth	20 (11.05)
Within 1 month of birth	16 (8.84)
Less than 4 months of birth	19 (10.50)
4-6 months of birth	15 (8.29)
After 6 months of birth	93 (51.38)
When did you first give solid food to the child?	
At birth	6 (3.31)
Less than 4 months of birth	7 (3.87)
4-6 months of birth	8 (4.42)
After 6 months of birth	160 (88.40)
Did you breastfeed your child in the night?	
Yes	168 (92.82)
No	13 (7.18)
Do you have often left the nipple in the mouth of the child when you sleep at night?	
Yes	42 (23.20)
No	139 (76.80)
Did your child use feeder to feed?	
Yes	169 (93.37)
No	12 (6.63)
When did your child start to use feeding bottle?	
At birth	24 (13.26)
Within 1 week of birth	9 (4.97)
Within 1 month of birth	32 (17.68)
Less than 4 months of birth	23 (12.71)
4-6 months of birth	20 (11.05)
After 6 months of birth	73 (40.33)
Did you bottle feed your child at night?	
Yes	135 (74.59)
No	46 (25.41)
Do you have often leave the bottle in the mouth of the child when you sleep?	
Yes	52 (28.73)
No	129 (71.27)

Demographic characteristic of children and caregivers

A study has shown that age is an independent risk factor for ECC (16). This study found that children aged three were more prevalent followed by aged six. Children at the age of three are at an increased risk of early childhood caries (ECC) due to their transition from a mixed feeding method following weaning to a regular diet. Meanwhile, five-year-old children are more prone to developing ECC due to their tendency to consume sugary snacks, particularly before bedtime (15). Furthermore, the period between the ages of three and six is crucial for children, as their feeding habits and oral health behaviours during this time can significantly impact the development of their primary teeth and potentially lead to ECC (15). Children between the ages of six and seven are in the early stages of mixed dentition, making them susceptible to dental caries and other dental disorders (17). This period is crucial for establishing healthy oral health habits (18). Therefore, proper oral hygiene habits in children and oral health education in parents are essential for early age to reduce ECC prevalence.

Moreover, the urbanization background of the studied population may contribute to a comparable pattern of ECC prevalence within the Sungai Buloh community (19). The Sungai Buloh area, characterized as semi-urban, experiences a growing population, which in turn limits residents' access to oral health services. Rural communities face challenges in accessing quality dental healthcare that integrates oral health with primary healthcare (20). Hence, interventions should be enacted across various levels, engaging healthcare professionals to establish patient-centred care teams within healthcare organizations and community settings. This approach aims to minimize disparities in access to oral health behaviours (21). Rural oral health services may face insufficient infrastructure, socioeconomic challenges, transportation hurdles, and high patient-to-professional ratios (15).

Child education emerged as a factor influencing the occurrence of ECC. The study revealed that 85% of children do not start school yet potentially contributing to ECC development. This underscores the significance of school-based health centres, which often offer fundamental dental screenings and preventive measures against ECC (22). There is a need for comprehensive oral health care, especially for children living in low-income neighbourhoods (21). Additionally, older children and more educated children have a better understanding of oral health (23). Parents should play their role in assisting children with oral health behaviour early oral health education, especially for the children less than six years old who do not go to school yet (23). Parents and caregivers are aware of the negative consequences of ECC on children's quality of life, nonetheless, their views toward the condition appear to be incorrect, influenced by everyday routines, doubts and beliefs (24).

Table VI: Association between Parents Behaviour on Child Oral health behaviour with Non ECC and ECC

Items	Non ECC n (%)	ECC n (%)	χ2 (df)	P - value
How often do you usually brush you child teeth?				
Irregularly or never	16 (17.8)	14 (15.4)	0.189 (2)	0.910[a]
Once a day or 2-3 times a week	30 (33.3)	31 (34.1)		
Twice or more per day	44 (48.9)	46 (50.5)		
When do child brush their teeth?				
Before meals	60 (66.7)	35 (38.5)	17.242 (3)	0.001[a]*
After meals	16 (17.8)	20 (22.0)		
No regular time interval	12 (13.3)	27 (29.7)		
Both before and after meals	2 (2.2)	9 (9.9)		
Who brushes child teeth?				
His/herself	47 (52.2)	43 (47.3)	0.447 (1)	0.504[a]
Caretaker	43 (47.8)	48 (52.7)		
What do you use to brush your child`s teeth				
Toothbrush	81 (90.0)	82 (90.1)	0.001	0.980[a]
Other than toothbrush	9 (10.0)	9 (9.9)		
How often do you use toothpaste containing fluoride when brushing child teeth?				
Always	30 (33.3)	31 (34.1)	0.560 (3)	0.906[a]
Quite often	9 (10.0)	8 (8.8)		
Seldom	23 (25.6)	27 (29.7)		
Not at all	28 (31.1)	25 (27.5)		
How often do you ask your child to use mouth rinse?				
Other than never	24 (1.1)	26 (28.6)	0.082 (1)	0.774[a]
Never	66 (26.7)	65 (71.4)		
How often do you use topical fluoride for your child?				
Other than never	39 (43.3)	46 (50.5)	0.946 (1)	0.331[a]
Never	51 (56.7)	45 (49.5)		
How often do you floss your child teeth?				
Always	22 (24.4)	19 (20.9)	0.328 (1)	0.567[a]
Never	68 (75.6)	72 (79.1)		
How often do you allow your child to eat sugar-containing snacks/drinks between his/her main meal?				
About 3 times a day or more	9 (10.0)	3 (3.3)	4.784 (4)	0.310[a]
About twice a day	2 (2.2)	4 (4.4)		
About once a day	10 (11.1)	14 (15.4)		
Occasionally, not everyday	53 (58.9)	57 (62.6)		
Rarely or never between meal	16 (17.8)	13 (14.3)		
What do you do for your child's last dental-check-up?				
I go to dentist	34 (37.8)	31 (34.1)	2.930 (2)	0.231[a]
I have access to the school dentist	25 (27.8)	18 (19.8)		
There is no need for a dental check-up	31 (34.4)	42 (46.2)		
When was your child dental check-up?				
Within last 6 months	15 (16.7)	8 (8.8)	2.533 (2)	0.282[a]
More than 6 months to one year ago	16 (17.8)	18 (19.8)		
Never	59 (65.6)	65 (71.4)		

[a] **Chi-Square**

Concerning the parent's demographic characteristics, the caregiver's education level is important in determining factors contributing to ECC (18). Parents with a strong educational background had higher oral health awareness and their children demonstrated better oral hygiene habits. As parental education is key risk factor for the development of ECC there is a need to develop family-oriented programs for ECC education. The risk of ECC should be recognized as soon as possible, and the most relevant preventive strategies should be adopted quickly, using correct information and on-site treatments.

This study shows 66.3% of parents work as government servants. The income status of workers in government areas had monthly salaries below RM3,000 which is the middle group of income classification (25). As a results, parents could not provide enough spending for their child's oral healthcare. Financially unwell parents tend to experience stress and distraction, which can impact absenteeism, efficiency, retirement, and spending on healthcare (25). Parents with greater socioeconomic levels will have more opportunities to acquire health information, attend public dental services, and receive oral health (24).

Table VII: Infant Feeding Profile with Non ECC and ECC

Items	Non ECC n (%)	ECC n (%)	χ2 (df)	P - value
Did you nurse the child from birth?				
Yes	87 (96.7)	91 (100.0)		0.121[b]
No	3 (3.3)	0 (0)		
Did you breastfeed the child?				
Yes	85 (94.4)	85 (93.4)	0.085 (1)	0.770[a]
No	5 (5.6)	6 (6.6)		
How long did you breastfeed the child?				
Less than 1 month	11 (12.2)	12 (13.2)	2.748 (6)	0.840 [a]
Less than 4 months	7 (7.8)	9 (9.9)		
4-6 months	10 (11.1)	11 (12.2)		
6-12 months	18 (20.0)	17 (18.7)		
12-18 months	11 (12.2)	9 (9.9)		
18-24 months	19 (21.1)	13 (14.3)		
More than 24 months	14 (15.6)	20 (22.0)		
When did you first give water to the child?				
At birth	7 (7.8)	11 (12.1)	1.747 (5)	0.883 [a]
Within 1 week of birth	11 (12.2)	9 (9.9)		
Within 1 month of birth	8 (8.9)	8 (8.8)		
Less than 4 months of birth	9 (10.0)	10 (11.0)		
4-6 months of birth	9 (10.0)	6 (6.6)		
After 6 months of birth	46 (51.1)	47 (51.6)		
When did you first give solid food to the child?				
Less than 4 months of birth	9 (10.0)	4 (4.4)	2.132 (1)	0.144 [a]
More than 4 months of birth	81 (90.0)	87 (95.6)		
Did you breastfeed your child in the night?				
Yes	81 (90.0)	87 (95.6)	2.132 (1)	0.144 [a]
No	9 (10.0)	4 (4.4)		
Do you have often left the nipple in the mouth of the child when you sleep at night?				
Yes	20 (22.2)	22 (24.2)	0.097 (1)	0.756 [a]
No	70 (77.8)	69 (75.8)		
Did your child use feeder to feed?				
Yes	84 (93.3)	85 (93.4)	0.000 (1)	0.984 [a]
No	6 (6.7)	6 (6.6)		
When did your child start to use feeding bottle?				
Less than 4 months of birth	44 (48.9)	44 (48.4)	0.005 (1)	0.942[a]
More than 4 months of birth	46 (51.1)	47 (51.6)		
Did you bottle feed your child at night?				
Yes	66 (73.3)	69 (75.8)	0.148 (1)	0.700 [a]
No	24 (26.7)	22 (24.2)		
Do you have often leave the bottle in the mouth of the child when you sleep?				
Yes	25 (27.8)	27 (29.7)	0.079 (1)	0.778 [a]
No	65 (72.2)	64 (70.3)		

[a] Chi-Square

[b] Fisher Exact Test

Oral Health Behaviours among children in Hospital Sungai Buloh

Parent's behaviours of dental practices were reportedly among the critical factors determining the quality of children's oral healthcare. This study found that 70% of parents did not ask their child to use mouthwash and floss their teeth. Consequently, this behaviour can lead to ECC. Only 5.8% of children are using floss or mouthwash because of the minimal knowledge about the effectiveness of using them to prevent ECC (23). Caries rates vary and have minimal effects if started late depending on the age of the initial fluoride mouth rinse, for mandibular first molars, 85% benefit from fluoride immediately after eruption if started at 5 years, while only 25% benefit if started at 6 years (26). Therefore, it is important that from an early age, children develop the right information and practices of oral hygiene to prevent the development of ECC.

In this study, 48% parents let their children brush tooth by themselves. A similar study reported that only a few (4.4%) parents frequently brushed their preschool child's teeth (27). However, about 82% ECC children used toothbrush for brush their teeth, but inadequate supervision or wrong technique of brushing may lead to ECC. Improper brushing technique by children could result in ECC (12). Reported that the tooth brushing behaviours of preschool children were inadequate, as

evidenced by the amount of toothpaste used, brushing duration, as consequences of poor parental guidance (12). Hence, an early age of children must acquire correct knowledge and habits of oral hygiene, especially about brushing their teeth at least twice a day, after meals and before bedtime. Brushing should be performed with fluoridated toothpaste, since its use, together with the brush fibres, prevents and controls bacterial plaque (23). Thus, preschool children require parental supervision to maintain oral hygiene due to their limited hand dexterity. Referring to dental visit practices, about 71.4% parents didn't take their child for dental check-up and about 42% reported stated there is no need for a dental check-up. Similarly reported although oral habits were observed in all children in the study and almost all used toothbrushes and toothpaste, most of them never had regular dental visits (22). Although parents indicated relatively good knowledge, there were poor levels of attitude and practice concerning children's oral health management due to financially unstable.

Infant's Feeding Profiles Among Children in Hospital Sungai Buloh

As infant feeding profile of the children in this study revealed all parents nursed and breastfed their children from birth about 91%. Approximately 22% of parents breastfed their child for more than 24 months which is the longest duration in this study. Breastfeeding for more than 12 months increases the risk of dental caries (28). In India, 30% of children were exclusively breastfed, 12.7% were exclusively bottle fed, and the remaining 57.2% were fed with both methods (29). Nocturnal bottle feeding in infancy is linked to a higher risk of dental caries, although the result is not significant, it might be due to mixed feeding by the children which is bottle feeding and breastfeeding which could lead to ECC caries (26). In contrast, another study found that breast milk had lower carcinogenicity than formula, suggesting that it does not negatively impact dental hard tissues (30). Breastfeeding has a longer duration and higher daily feeding frequency than bottle feeding, which could explain this difference. Additionally, children who fall asleep while breastfeeding may be at a higher risk of developing ECC. Clinicians should offer information on proper feeding, mouth hygiene, and frequent dental exams for parents of breastfed children. Contradicting results were reported in few other studies. For instance, in an earlier study in Kelantan, Malaysia shows that almost all parents agreed on the importance of a balanced diet for healthy teeth (12). Specifically, around 50% of the parents in their study frequently gave plain water after feeding the child, and around 40% gave semisolid food at the one-year stage. A possible reason explaining the mixed feeding profiles of the children is the behavioural influences of the family, particularly mothers. There were significant differences between feeding groups by maternal occupation, breastfeeding duration, and stage of solid food introduction (31). In this study, most the parents were working, and majority of the children were in preschool or kindergarten. Therefore, family's daily activities may contribute to the varying feeding patterns of the children delayed introduction of weaning food led to greater rates of dental caries, while cow's milk and nutritional supplements had no significant impact on ECC (28).

Association between Oral health behaviours and infant Feeding Profiles with ECC and non ECC in Hospital Sungai Buloh

Significant association shown between parents' time to brush their child's teeth and their ECC condition ($p = .001$). Specifically, children with ECC outperformed the non-ECC group in terms of time spent brushing their teeth after meals, as well as both before and after meals. Meanwhile, the non-ECC group showed a higher time for brushing their teeth before taking meals. Additionally, between the parents' infant feeding practice and their children's ECC status similarly revealed that none of the pair analysed showed any significant association ($p > 0.05$).

A study in Kelantan by Pardan et al. also reported that no significant difference in the children's feeding patterns in terms of oral health impact (32). Parental education, a socioeconomic determinant, was found to influence their propensity to care for their children's teeth from an early age (33). Additionally, parents with higher education levels had a better understanding of oral health and dental care needs (33). Children with educated parents were more likely to keep good dental hygiene. Even though the majority of parents in our study report that they breastfed their children, most of them also engaged in nighttime bottle-feeding. This practice is known to increase the risk of ECC, particularly when sugary liquids or formula are used. A study in Kuantan by Rusali et al. proved that bottle-feeding practice in bed significantly linked to ECC status (34).

However, studies in India by Sabbarwal et al. (22) and Barjatya et al. (35), reported that there were significant associations between feeding practices particularly prolonged bottle-feeding or frequent nighttime feeding and ECC. The divergence from these studies may be due to differences in the populations studied, the specific feeding practices assessed, or the confounding factors considered. Other factors such as oral hygiene, socioeconomic status, and parental education levels might have a more dominant influence on ECC development, overshadowing the role of infant feeding profiles.

The lack of a significant relationship between infant feeding profiles and ECC suggests that feeding practices alone may not predict caries development. This emphasizes the need to consider a wider range of factors, including parental oral health habits, diet, and environmental influences. Future research should investigate the specific elements of feeding behaviours,

such as the type of liquids, frequency of nighttime feeding, and hygiene practices after feeding, using larger and more diverse populations. Longitudinal studies could help clarify how feeding practices interact with other risk factors in ECC development.

Overall, these findings suggest that parental factors, such as oral health behaviours and feeding practices, may not strongly influence children's ECC status. Rapid socioeconomic and cultural changes, along with environmental factors, could also impact ECC prevalence and development (33). This supports the idea that while parental involvement is key to preventing caries, other external influences, such as shifting diets, hygiene habits, and access to dental care, also play a crucial role in shaping children's oral health.

CONCLUSION

The prevalence of ECC in Hospital Sungai Buloh reported slightly above half from the population. Nevertheless, report may differ from the true prevalence of ECC in the community as the study only be held in Hospital Sungai Buloh. Parents' behavioural factors and infant feeding practices necessarily act as a key decisive role in declining the development of dental caries among children. More preventative measures such as education programs, health and preventative programs should be held to reduce ECC prevalence. This study requires of deeper exploration of multifaceted factors influencing the prevalence of ECC among the community in Malaysia necessary to improve oral health care among children and guarantee the quality of life of the children in Malaysia.

ACKNOWLEDGMENT

We want to thank Universiti Teknologi MARA and Hospital Sungai Buloh for supporting this study.

REFERENCES

1. Oral Health Policies & Recommendations (The Reference Manual of Pediatric Dentistry). Available from: https://www.aapd.org/research/oral-health-policies--recommendations/early-childhood-caries-classifications-consequences-and-preventive-strategies/88-89
2. Philip N, Suneja B, Walsh L. Beyond Streptococcus mutans: clinical implications of the evolving dental caries aetiological paradigms and its associated microbiome. British dental journal. 2018 Feb 23;224(4):219-25. doi: 10.1038/sj.bdj.2018.81
3. Devan I, Ramanarayanan V, Janakiram C. Prevalence of early childhood caries in India: a systematic review and meta-analysis. Indian Journal of Public Health. 2022 Nov 1;66(Suppl 1): S3-11. doi: 10.4103/ijph.ijph_1078_22.
4. Zou J, Du Q, Ge L, Wang J, Wang X, Li Y, Song G, Zhao W, Chen X, Jiang B, Mei Y. Expert consensus on early childhood caries management. International journal of oral science. 2022 Dec;14(1):1–14. doi: 10.1038/s41368-022-00186-0.
5. Uribe S, Innes N, Maldupa I. The global prevalence of early childhood caries: A systematic review with meta-analysis using the WHO diagnostic criteria. International Journal of Paediatric Dentistry [Internet]. 2021 Apr 30;31(6):817–30. doi: 10.1111/ipd.12783.
6. Pierce A, Singh S, Lee J, Grant C, Cruz de Jesus V, Schroth RJ. The burden of early childhood caries in Canadian children and associated risk factors. Frontiers in public health. 2019 Nov 12;7:2–14. doi: 10.3389/fpubh.2019.00328.
7. Pakkhesal, Mina, Elham Riyahi, AliAkbar Naghavi Alhosseini, Parisa Amdjadi, and Nasser Behnampour. Impact of dental caries on oral health related quality of life among preschool children: perceptions of parents. BMC Oral Health. 2021 Feb 15;21(1):1-8. doi: 10.1186/s12903-021-01396-4.
8. Ali SNA, Alsineedi F, Alsamari N, AlDuhayan GA, BaniHani A, Farah RI. Risk factors of early childhood caries among preschool children in eastern Saudi Arabia. Science Progress [Internet]. 2021 Apr 1;104(2):1–13. doi: 10.1177/00368504211008308
9. Yusof N, Ghazali LM, Zulkifle NS. Social & behavioral risk factors and early childhood caries–A cross-sectional study on preschool children in Shah Alam. Compendium of Oral Science. 2021 Sep 1;8:11-20. doi: 10.24191/cos.v8i0.17479
10. Folayan MO, Kolawole KA, Oziegbe EO, Oyedele T, Oshomoji OV, Chukwumah NM, et al. Prevalence, and early childhood caries risk indicators in preschool children in suburban Nigeria. BMC Oral Health [Internet]. 2015 Jun 29;15(1):1-12. doi: 10.1186/s12903-015-0058-y
11. Polit DF, Beck CT, Owen SV. Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. Research in Nursing & Health. 2007;30(4):459–67. Doi:10.1002/nur.20199
12. Khan IM, Mani SA, Doss JG, Danaee M, Kong LYL. Pre-schoolers' tooth brushing behaviour and association with their oral health: a cross sectional study. BMC Oral Health [Internet]. 2021 Jun 2;21:2–1. doi: 10.1186/s12903-021-01643-8
13. Ndekero TS, Carneiro LC, Masumo R. Prevalence of early childhood caries, risk factors and nutritional status among 3-5-year-old preschool children in Kisarawe, Tanzania. PLOS ONE [Internet]. 2021 Feb 25;16(2):1–13. doi: 10.1371/journal.pone.0247240
14. Lipsky MS, Su S, Crespo C, Hung M. Men and Oral Health: A Review of Sex and Gender Differences. American Journal of Men's Health [Internet]. 2021 May 1;15(3):1–6. doi: 10.1177/15579883211016361.
15. Li J, Wu F, Zhou Y, Wu L, Liu W, Huang S. The status and associated factors of early childhood caries among 3- to 5-year-old children in Guangdong,

Southern China: a provincial cross-sectional survey. BMC Oral Health [Internet]. 2020 Sep 25;20:1–7. doi: 10.1186/s12903-020-01253-w
16. Zhang M, Zhang X, Zhang Y, Li Y, Shao C, Xiong S, et al. Assessment of risk factors for early childhood caries at different ages in Shandong, China and reflections on oral health education: a cross-sectional study. BMC Oral Health [Internet]. 2020 May 12;20:1–9. doi: 10.1186/s12903-020-01104-8
17. Ahiko N, Baba Y, Tsuji M, Horikawa R, Moriyama K. Investigation of maxillofacial morphology and oral characteristics with Turner syndrome and early mixed dentition. Congenital Anomalies [Internet]. 2018 Apr 25;59(1):11–7. Doi:10.1111/cga.12284
18. Chen L, Hong J, Xiong D, Zhang L, Li Y, Huang S, et al. Are parents' education levels associated with either their oral health knowledge or their children's oral health behaviors? A survey of 8446 families in Wuhan. BMC Oral Health [Internet]. 2020 Jul 11;20:1–11. doi: 10.1186/s12903-020-01186-4
19. Ha D, Crocombe L, Khan S, Do L. The impact of different determinants on the dental caries experience of children living in Australia rural and urban areas. Community Dentistry and Oral Epidemiology [Internet]. 2020 Dec 1;49(4):337–45. doi: 10.1111/cdoe.12606
20. Adil AH, Eusufzai SZ, Kamruddin A, Ahmad WMAW, Jamayet NB, Karobari MI, et al. Assessment of Parents' Oral Health Literacy and Its Association with Caries Experience of Their Preschool Children. Children (Basel) [Internet]. 2020 Aug 18;7(8):1–13. doi: 10.3390/children7080101
21. Northridge ME, Kumar A, Kaur R. Disparities in access to oral health care. Annual review of public health. 2020 Apr 1;41:513-35. doi: 10.1146/annurev-publhealth-040119-094318.
22. Sabbarwal B, Puranik MP, Uma SR. Association between parental behavior and child's oral health among 3–5-year-old children in Bengaluru city. International Journal of Clinical Pediatric Dentistry. 2020 Nov;13(6):13–677
23. Seabra RM, Reis FR, Novo VA, Rego Simxes CM, Sa-Couto P, Simxes JL. Knowledge and Behaviors of Oral Health in Children: A Cross-Sectional and Correlational Study. Am J Nurs Stud. 2021;2(2):034–040.
24. Lotto M, Strieder AP, Aguirre PEA, Machado MAAM, Rhos D, Cruvinel AFP, et al. Parental perspectives on early childhood caries: A qualitative study. International Journal of Paediatric Dentistry [Internet]. 2020 Feb 16;30(4):451–8. doi: 10.1111/ipd.12622
25. Sabri M, Wijekoon R, Rahim H. The influence of money attitude, financial practices, self-efficacy and emotion coping on employees' financial well-being. Management Science Letters. 2020;10(4):889-900. doi: 10.5267/j.msl.2019.10.007
26. Yonezawa D, Yagi M. Effect of a school-based fluoride mouth-rinsing programme on dental caries. International Dental Journal [Internet]. 2022 Aug 1;72(4):506–11. doi: 10.1016/j.identj.2021.12.003
27. Chawłowska E, Karasiewicz M, Lipiak A, Cofta M, Fechner B, Lewicka-Rabska A, et al. Exploring the Relationships between Children's Oral Health and Parents' Oral Health Knowledge, Literacy, Behaviours and Adherence to Recommendations: A Cross-Sectional Survey. International Journal of Environmental Research and Public Health [Internet]. 2022 Sep 8;19(18):2–18. doi: 10.3390/ijerph191811288
28. Van Meijeren-Van Lunteren AW, Voortman T, Elfrink MEC, Wolvius EB, Kragt L. Breastfeeding and Childhood Dental Caries: Results from a Socially Diverse Birth Cohort Study. Caries Research [Internet]. 2021 Jan 1;55(2):153–61. doi: 10.1159/000514502
29. Prakash P, Subramaniam P, Durgesh BH, Konde S. Prevalence of early childhood caries and associated risk factors in preschool children of urban Bangalore, India: A cross-sectional study. European Journal of Dentistry [Internet]. 2012 Apr 1;06(02):141–52. doi: 10.1055/s-0039-1698943
30. Park, Y. H., & Choi, Y. Y. (2022). Feeding practices and early childhood caries in Korean preschool children. International Dental Journal, 72(3), 392–398. https://doi.org/10.1016/j.identj.2021.07.001
31. Komninou S, Halford JC, Harrold JA. Differences in parental feeding styles and practices and toddler eating behaviour across complementary feeding methods: Managing expectations through consideration of effect size. Appetite. 2019 Jun 1;137:198-206. doi: 10.1016/j.appet.2019.03.001
32. Pardan N, Hasan R, Samsudin NA, Ahmad WMAW. Preschool Children feeding patterns and early childhood oral health impact in Tanah Merah, Kelantan, Malaysia. Malaysian Journal of Medicine and Health Sciences [Internet]. 2023 Jul 7;19(4):178–85. Doi: org/10.47836/mjmhs.19.4.27
33. Pratamawari DN, Atikasari D, Bramantoro T. The effect of parents' socioeconomic factors on their willingness to take care of their children's oral health in early childhood. Journal of International Dental and Medical Research. 2022 May 1;15(2):845-9. ISSN 1309-100X
34. Barjatya K, Nayak UA, Vatsal A. Association between early childhood caries and feeding practices among 3–5-year-old children of Indore, India. Journal of Indian Society of Pedodontics and Preventive Dentistry [Internet]. 2020 Jan 1;38(2):98–102. doi: 10.4103/jisppd.jisppd_60_20
35. Rusali R, Najwa Hamali N, Muhammad Razi F, Mustafa N, Asilah Harun N, Azwani Mohd Shukri N. Early Childhood Feeding Practices and Its Association with Early Childhood Caries. J Food Nutr Res. 2019;7(11):801–804. doi: 10.12691/jfnr7-11-7