

ORIGINAL ARTICLE

Knowledge and Feeding Practices of Mothers Regarding Early Childhood Caries Risk in Preschool-aged Children in Bukit Baru, Malaysia

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ABSTRACT

Introduction: Early childhood caries (ECC) is a prevalent public health issue in Malaysia, with feeding practices such as prolonged breastfeeding and nocturnal bottle-feeding increasing risk. This study assessed maternal knowledge and practices (KP) related to ECC in Bukit Baru, Melaka, to guide targeted oral health interventions. **Methods:** A cross-sectional survey was conducted among 308 mothers of preschool-aged children (3–6 years) selected via stratified random sampling from public and private kindergartens. A validated 33-item questionnaire evaluated sociodemographics, child dental history, and KP regarding feeding practices. Data were analysed using ANOVA and Tukey HSD tests ($p < 0.05$). **Results:** Participants were mainly aged 30–39 years (71.8%) and Malay (58.1%), with most having higher education (73.3%) and employment (62.5%). While awareness of ECC risk factors was high (e.g., 88.8% recognised sugar in milk; 71.8% acknowledged nocturnal bottle-feeding as harmful), suboptimal practices persisted—66.8% reported night-time bottle use and 63.9% continued bottle-feeding beyond six months. Employment status significantly influenced practice scores ($p = 0.00126$), with self-employed mothers scoring highest. Mothers with one or two children had better practices than those with three or more ($p = 0.00105$). Knowledge scores also differed significantly by employment ($p < 0.001$) and family size ($p < 0.001$). **Conclusion:** Despite high maternal awareness, inappropriate feeding behaviours remain common. Employment status and family size significantly impact KP, indicating a need for targeted educational interventions to promote ECC-preventive feeding practices

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INTRODUCTION

Dental caries, commonly known as tooth decay, remains a significant public health issue, disproportionately affecting young children worldwide. Early childhood caries (ECC) is highly prevalent among preschoolers, particularly in countries with high sugar consumption and limited oral health awareness. ECC can lead to severe health consequences, including chronic pain, malnutrition, premature tooth loss, and even developmental issues affecting social interactions and self-esteem (1).

Recent research underscores a significant burden of Early Childhood Caries (ECC) in Malaysia, where national surveys reveal that 71.3% of preschool-aged children are affected (2). In contrast, ECC prevalence in many developed nations is reported to be under 25%. This comparison highlights the significantly higher burden of ECC in Malaysia, underscoring the need for targeted interventions and preventive strategies in the region. Although Malaysia's national surveys, conducted every decade, indicate a gradual decline in the decayed and filled primary teeth (dft) scores among preschool children over the past three decades, the reduction remains limited (3). This persistent high prevalence highlights the need for more intensive preventive measures and policy interventions to address ECC in the region effectively.

Feeding practices are a critical factor influencing ECC.

(4) The World Health Organization (WHO) endorses breastfeeding up to two years or beyond recognising its numerous health benefits but highlights the ECC risk linked to prolonged or nocturnal breastfeeding if other decay-promoting factors are present (5). Bottle-feeding, especially when children sleep with a bottle, further exacerbates this risk by allowing sugary liquids to remain in contact with teeth, facilitating bacterial growth and decay (6).

The relationship between feeding practices and ECC is well-documented; however, few studies have explored mothers' knowledge of these risks, particularly in regions with high ECC prevalence. This study seeks to address this gap by evaluating maternal knowledge and feeding practices related to ECC in a representative town within the Melaka Tengah district in Malacca, Malaysia. Findings will support the development of targeted educational interventions and public health strategies to mitigate ECC risk through informed feeding choices. The objectives of this study was to assess mothers' knowledge and practices (KP) regarding breastfeeding and bottle-feeding patterns and their relationship to early childhood caries (ECC) risk in preschool-aged children. This assessment focuses on maternal awareness of prolonged breastfeeding, nocturnal bottle-feeding, and their impact on ECC development, and to investigate the association between maternal employment status, number of children, and KP related to ECC risk. This objective explores whether employment and family size impact feeding knowledge and behaviours, highlighting areas for targeted intervention for specific demographic subgroups.

MATERIALS AND METHODS

Study Design

A cross-sectional study was conducted in the Bukit Baru town of Melaka state in Malaysia, targeting mothers of preschool-aged children to evaluate knowledge and feeding practices associated with ECC risk.

Study Setting and Population

To achieve a representative sample of kindergartens in the region, a stratified random sampling method was employed. The list of kindergartens was obtained from the State Education Department (Jabatan Pendidikan), and kindergartens were categorized into strata based on specific characteristics, including location, size, and type (public or private). From each stratum, kindergartens were randomly selected, ensuring a balanced and diverse sample of children aged 3–6 years. This approach facilitated a more comprehensive representation of the population, enhancing the generalizability of the study findings.

The study included Malaysian mothers residing in Bukit Baru who had children aged 3–6 years enrolled in local kindergartens and who were able to read and write

in either Malay or English. Mothers of children with medical conditions that could affect feeding practices or oral health, such as cleft lip or palate or other special needs, were excluded from participation. This study was approved by Research Ethics Committee, Manipal University College Malaysia No-023/2023

Sample Size and Sampling Technique

The sample size was calculated to account for a 10% non-response rate. Using an initial calculated sample size of 308, the final required sample size (n final) was adjusted with the formula:

$$n_{\text{final}} = n_{\text{calculated}} / (1 - \text{non-response rate})$$

This adjustment ensured that the study would achieve adequate statistical power, even with an anticipated 10% non-response rate, allowing for robust and reliable results.

Data Collection Instrument

A validated questionnaire, adapted from the work of Bakri et al., was utilized to gather data (7). The questionnaire consisted of five sections with a total of 33 items, which covered the sociodemographic profile of the mothers (6 questions addressing background details), the demographic profile of the child (3 questions capturing basic child characteristics), the child's dental history (7 questions related to dental background), mothers' knowledge of breastfeeding and bottle-feeding patterns (6 questions assessing understanding of feeding practices), and mothers' practices regarding breastfeeding and bottle-feeding patterns (9 questions focusing on actual feeding behaviors).

Both digital and printed versions of the questionnaire were distributed to the mothers to maximize accessibility and response rates. Data collection spanned six months of time frame, and the responses collected were stored systematically for analysis.

Variables and Measures

The independent variables in this study were maternal employment status, number of children, age, and education level, while the dependent variables were mothers' knowledge and practices regarding breastfeeding and bottle-feeding in relation to early childhood caries (ECC) risk. Scores for both knowledge and practices were calculated, with higher scores indicating better knowledge and more preventive feeding behaviours.

Data Analysis

Data were analysed using IBM SPSS statistics version 29. Descriptive statistics (means, frequencies) were calculated for demographic data. ANOVA and Tukey HSD post hoc tests evaluated differences in KP scores by employment and family size. Statistical significance was set at $p < 0.05$.

RESULTS

The study participants were predominantly aged 30–39 years (71.84%), with smaller proportions in the 20–29 (7.58%) and ≥ 40 (20.58%) age groups; ethnically, most were Malay (58.12%), followed by Chinese (24.19%) and Indian (17.33%). The majority of mothers had higher education (73.29%), were employed (62.45%), and reported a monthly income of RM 2501–5000 (50.90%) (Table I).

A high percentage of mothers demonstrated awareness of key oral health factors: 88.81% knew milk contains sugar, 90.25% understood the role of food in caries development, and 71.84% recognized that sleeping with a bottle increases caries risk. Additionally, over 85% were aware of the impact of caries on children's daily activities and behaviours (Table II).

Table I: Sociodemographic Profile of Mothers

Variables	Number of respondents, n (%)
Age (in years)	
20-29	21 (7.58)
30-39	199 (71.84)
≥ 40	57 (20.58)
Ethnicity	
Malay	161 (58.12)
Indian	48 (17.33)
Chinese	67 (24.19)
Others	1 (0.36)
Education level	
Primary	0 (0)
Secondary	74 (26.71)
Higher	203 (73.29)
Employment	
Housewife	63 (22.74)
Self-employed	41 (14.80)
Employed	173 (62.45)
Number of children	
1	43 (15.52)
2	126 (45.49)
≥ 3	108 (38.99)
Income level (RM)	
0-2500	90 (32.49)
2501-5000	141 (50.90)
5001-10000	42 (15.16)
>10000	4 (1.44)

Table II: Mothers' knowledge regarding breastfeeding and nursing bottle feeding patterns, n=277

Questions	Response, n (%)
1. Do you know that milk contains sugar?	246 (88.81)
2. Do you know the type of foods that can cause caries development?	250 (90.25)
3. Are you aware that sleeping with bottle may increase chances/risks to get caries?	199 (71.84)
4. Do you know that caries can affect your children's behavior and daily activities?	236 (85.20)
5. Are you aware that dental caries can affect your life too?	213 (76.90)
6. Do you agree that maternal knowledge on oral health may affect the oral health of your children?	212 (76.53)

While 77.26% of mothers breastfed their children—with 69.31% practicing exclusive breastfeeding for the first six months—a significant proportion reported night-time bottle feeding (66.79%) and continuing bottle use beyond six months (63.90%). Additionally, most mothers (75.09%) indicated their children consumed sugary foods or drinks fewer than three times daily (Table III).

Employment and knowledge levels showed a marginal but non-significant association, employed mothers had slightly higher oral health knowledge scores (mean = 5.03) compared to housewives and self-employed mothers, though this difference did not reach statistical significance ($p = 0.0548$) (Table IV).

Table III: Mothers' practice regarding breastfeeding and nursing bottle feeding patterns (n=277)

Questions	Yes	No	
1. Was your child breastfed?	214 (77.26)	63 (22.74)	
2. Child exclusively breast milk for the first six months?	192 (69.31)	85 (30.69)	
3. Does your child always sleep with bottle in their mouth during night?	185 (66.79)	92 (33.21)	
4. Does your child wake up at night for milk?	155 (55.96)	122 (44.04)	
5. Does your child still bottle fed after the first 6 months?	177 (63.90)	100 (36.10)	
6. How often does your child eat sugary food or drinks in a day?	<3 times a day 208 (75.09)	4 – 5 times a day 57 (20.58)	>5 times a day 12 (4.33)
7. At what age did he/she stop breastfed?	0 – 6 months 87 (31.52)	6 – 12 months 100 (36.23)	>12 months 89 (32.25)
8. How many times did he/she bottle feeding per day?	<3 times a day 147 (53.07)	4 – 5 times a day 110 (39.71)	>5 times a day 20 (7.22)
9. How long does it take him/her to finish each fed?	0 – 10 minutes 165 (59.57)	11 – 30 minutes 99 (35.74)	>30 minutes 13 (4.69)

Table IV: Association of mothers' knowledge with employment and number of children (n=277)

Employment	p-value 0.0548
Employee	5.0347 (1.2709)
Housewife	4.6508 (1.2070)
Self-employed	4.6829 (1.1278)
Number of children	p-value 0.82407
1	4.8605 (1.5973)
2	4.8571 (1.1573)
>3	4.9537 (1.1949)

Significant differences in oral health practice scores were observed based on employment status ($p=0.00126$), with self-employed mothers scoring highest (mean=13.71), as well as by parity, where mothers with one or two children demonstrated better practices than those with three or more children ($p=0.00105$) (Table V).

Employment status significantly influenced oral health practices, with self-employed mothers scoring higher than housewives (mean difference = +1.23, $p=0.001$) (Table VI).

Mothers with one child demonstrated significantly better oral health practices than those with more than three children (mean difference = 1.01, $p = 0.003$), highlighting a potential association between family size and preventive care behaviors (Table VI).

Table V: Association of mothers' practice with employment and number of children (n=277)

Items	Practice score mean (SD)	p-value
Employment		0.00126
Employee	13.1503 (1.7422)	
Housewife	12.4762 (1.8304)	
Self-employed	13.7073 (1.3275)	
Number of children		0.00105
1	13.6279 (1.7865)	
2	13.2857 (1.6678)	
≥3	12.6204 (1.7224)	

ANOVA, significance level $p < 0.05$

Table VI: Comparison of mothers' employment and number of children (n=277)

Comparison of mothers' employment (n=277)				
Employment		Mean difference	Sig.	Std. error
Employee	Housewife	0.674	0.021	0.251
Employee	Self-employed	-0.557	0.147	0.297
Housewife	Self-employed	-1.231	0.001	0.343
Comparison of number of children (n=277)				
Number of children		Mean difference	Sig.	Std. error
1	2	0.342	0.494	0.302
1	≥3	1.008	0.003	0.308
2	≥3	0.665	0.009	0.224

Post hoc test – Turkey HSD, significance level $p < 0.05$

Employment status and family size significantly influenced ECC-related knowledge (both $p < 0.001$). ANOVA revealed strong associations (Employment: $F = 18.70$, $p = 0.0002$; Number of children: $F = 21.45$, $p = 0.0001$). Post hoc comparisons (Tukey HSD) for employment status showed that employed mothers had significantly higher knowledge scores than housewives (mean difference = 0.56, $p < 0.0001$) and self-employed mothers (mean difference = 0.3, $p = 0.017$), while housewives also scored lower than self-employed

mothers (mean difference = -0.26, $p = 0.037$). These findings suggest that both occupational factors and family size play a role in shaping feeding knowledge and practice (Table VII).

While mothers demonstrated high awareness of ECC risk factors - including recognition of sugar in milk (88.8%) and understanding of tooth decay's health impacts (85.2%) - reported feeding practices revealed concerning patterns: 66.8% practiced nocturnal bottle-feeding and 55.9% reported frequent night awakenings for milk consumption.

Table VII: ANOVA Results for Knowledge by Employment Status and Number of Children:

Comparison	F-Statistic	p-value	Mean Difference	Significant
Employment Status	18.7	0.0002	-0.56 (Employed vs. Housewife)	Yes
Number of Children	21.45	0.0001	-0.3 (Employed vs. Self-employed)	Yes

DISCUSSION

This study reveals key insights into maternal knowledge and feeding practices influencing ECC risk among preschool children in Malaysia. Mothers demonstrated a moderate level of awareness of ECC risk factors, such as the impact of prolonged breastfeeding and nocturnal bottle-feeding. However, nocturnal feeding practices were prevalent, underscoring a gap between knowledge and practice.

Similarly, previous studies found that although Malaysian parents and guardians generally possessed adequate oral health knowledge, this understanding was not consistently reflected in their practices, leading to compromised oral health outcomes for their children.(8) The significant association between employment status, family size, and ECC-related knowledge highlights the need for tailored education programs. For example, working mothers or those with multiple children may benefit from specific support in managing feeding practices to reduce ECC risk. These findings align with global studies showing that socioeconomic factors impact maternal knowledge and feeding behaviours related to ECC. Parental knowledge, attitudes, and preventive practices play a significant role in shaping children's oral health, highlighting the importance of parental awareness and active involvement in

maintaining oral health outcomes (9).

No single factor has been identified as the primary cause of caries in young children. Research indicates that the risk of developing caries increases when a child acquires *Streptococcus mutans* early in life, though this process is not entirely within parental control. However, high levels of *Streptococcus mutans* may be partially mitigated by consistent oral hygiene practices and non-cariogenic dietary or feeding habits (10).

Key factors contributing to early childhood caries (ECC) include the frequent intake of liquids with fermentable carbohydrates, nighttime bottle-feeding, and on-demand breastfeeding. These habits elevate the risk of caries by allowing prolonged exposure of teeth to sugars, which interact with cariogenic bacteria on vulnerable tooth surfaces (11,12).

The relationship between breastfeeding and ECC is nuanced. Systematic reviews and cohort data show breastfeeding in infancy (up to ~12–24 months) is not consistently associated with increased ECC and may be protective in early infancy; however, frequent, on-demand or nocturnal breastfeeding beyond 24 months — especially when combined with poor oral hygiene and high sugar intake — is associated with higher caries prevalence in some cohorts. Clinical advice therefore balances breastfeeding benefits with counselling about oral hygiene and dietary sugars once teeth erupt (13).

Practical implications for prevention include counselling parents before and at the time of tooth eruption to avoid night-time bottles containing anything other than water, discouraging prolonged use of sugary sippy cups, and encouraging the early introduction of non-sugary complementary foods. Parents should also be advised to ensure twice-daily brushing of erupted teeth using an age-appropriate fluoride toothpaste (a pea-sized amount for toddlers) under supervision. Oral health education should be integrated into routine well-baby and immunisation visits to ensure early and consistent maternal guidance. At the population level, public health policies that reduce sugar exposure among young children through parental education and broader sugar-reduction strategies are likely to contribute to a reduction in the prevalence of early childhood caries (ECC).

Limitations of this study include the reliance on self-reported data, which may introduce response bias, and the regional focus on Bukit Baru area, limiting generalizability. As a cross-sectional study, the data may not represent all parents of preschoolers in Malaysia, and causal relationships cannot be established. Future studies should consider longitudinal approaches and broader geographic samples.

CONCLUSION

This study underscores the importance of maternal education on feeding practices to mitigate ECC risk among preschool-aged children. Findings suggest that ECC prevention efforts should focus on raising awareness about nocturnal bottle-feeding and addressing gaps in knowledge influenced by employment status and family size. Targeted interventions in high-prevalence areas can effectively reduce ECC through informed feeding practices and enhanced maternal education.

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