The Influence of Parental Oral Health Knowledge, Attitudes and Practices on Their Children.

.

ABSTRACT

Background: Severely infected primary teeth from early childhood caries (ECC) cause pain and can negatively impact children's oral health, development, nutrition, and quality of life. As children tend to adopt their parents' oral health knowledge and practices, knowing the knowledge, attitude, and practice of the parents could help to prevent dental caries in children.
Aims: To assess the influence of parental oral health knowledge, attitudes, and practices (KAP) on the oral health outcomes of their children under 6 years of age.
Methods and Material: Cross-sectional study using a self-administered questionnaire was conducted among 631 parents or caregivers of children below 6 years old who were randomly selected. The inclusive criteria included all parents or caregivers who attended appointments in Belait and Tutong Districts, between the period of January 2024 and March 2024. Illiterate parents or caregivers and parents or caregivers who participated in the pre-test were excluded. In the analysis, the sociodemographic variables and the correct answers for each domain were described as counts and percentages. The level of KAP was graded as "pass" or "fail" for each participant. These numbers of "pass" and "fail" for each domain were described as counts and percentages. The chi-squared test and logistic regressions were used to determine the associations between the sociodemographic variables and the grade of each domain. All the data collected was analyzed using R-studio Version 2022.12.0+353.
Results: 546 participated and 86.4% responded. Parental age of 30-40 and parents with College or Diploma and Bachelor degree or higher background were significantly associated with good oral health knowledge. Male parents were statistically associated with good oral health attitudes, and parents with 3-4 children were associated with good oral health practices.
Conclusion: Parental characteristics play a crucial role in shaping children's oral health attitude and practice. Therefore, focus on motivating parents to improve their own oral health not only benefit their own oral health but also their children's

Keywords: oral health, parents, knowledge, attitude, practices

1. INTRODUCTION

According to the Global Burden of Disease Study in 2017, over 530 million children worldwide suffer from dental caries in their primary teeth. Early childhood caries (ECC) is a term used for any caries that appear on the primary teeth of children under the age of six [1]. ECC can significantly impact individuals, families, and societies as it affects both primary and permanent teeth and influences general health and quality of life throughout a person's life. Moreover, ECC is associated with other common childhood diseases, primarily due to risk factors shared with other noncommunicable diseases (NCDs), such as high sugar intake, and the disease relates to other health conditions, such as obesity [2].

Dental caries can cause toothaches, abscesses, and other problems that may make it difficult for children to eat and sleep, and limit their everyday activities. Additionally, ECC can be a financial burden for families and society, especially when extensive dental repair under general anaesthesia is required. Severe dental caries in children cause frequent school absenteeism and hinder their growth and development[2].

Dental caries develops when the dental plaque, a biofilm consisting of multiple microorganisms, is not removed regularly, and the diet mainly consists of monosaccharides. These monosaccharides found in sugary diets, especially sweetened food, and beverages, can be metabolized by oral bacteria, leading to an increased production of acids that demineralize the enamel of the tooth [3,4]. Poor oral health habits like improper brushing technique, feeding pattern, and high sugar consumption could increase acid production, increasing the risk of caries.

Developing optimal oral health habits in children from an early age is a paramount for reducing the prevalence of dental caries. Previous research has consistently reviewed the correlations between feeding practices, brushing routines, and the susceptibility to caries. Nishimura et al. (2008) identified the associations between breastfeeding and the consumption of liquids other than water from a bottle can increase a child's susceptibility to caries [5]. Similarly, Wong et al. (2012) underscored the heightened risk of caries in children bottle-fed during sleep [6]. Tham et al. (2015) comprehensive review highlighted that children who breastfed for more than 12 months have an increased risk of caries compared to those who breastfed for less than 12 months. This risk is elevated when coupled with nocturnally or more frequently feeding [7]. However, Avila et al. (2015) contradicted these findings, suggesting that breastfed children generally exhibit lower caries incidence than bottle-fed children [8]. Sobiech et al. (2022) added to this discourse by pinpointing breastfeeding and bottle-feeding after the 18th month of life as the potential contributors to caries development, while emphasizing the protective role of breastfeeding in the first six months of a baby's life [9].

Moreover, inadequate brushing practices have emerged as a significant factor amplifying caries risk in children. Nishimura et al. (2008) and Sobiech et al. (2022) found that brushing without parental supervision can increase caries development [5,9]. Wong et al. (2012) found that delayed initiation of brushing, after 12 months of age contributes to increased caries risk [6]. Hsieh et al. (2012) found that low frequency and improper toothbrushing methods exacerbate the risk [10]. Sobiech et al. (2022) also highlighted the role of hygienic neglect, and delayed introduction of oral health behaviours may contribute to the development of caries in toddlers [9].

Additionally, dietary factors such as high sugar intake have been implicated in elevating caries risk among children [5]. High-frequency snaking and consumption of sugary drinks like soda are associated with heightened caries susceptibility [6, 11, 12]. A review by Sandy et al. (2023) highlighted that the risk of ECC is strongly linked to feeding practice and sugar intake [13].

Baseline caries status is also a predictor for progression of more severe caries. Lim et al. (2015) and Javed et al. (2016) have shown that children with existing caris are at greater risk of developing more severe caries [11,14]. As dental anxiety may develop during early dental treatment which can lead to avoiding necessary treatment [15]

Preventive measures are thefore of utmost importance in reducing the incidence of caries and protecting children's quality of life. Parents are the primary decision-makers regarding their children's health, so they should be considered crucial in preventing ECC.

Primary teeth are wrongly referred to as “provisional teeth”, when in fact they are responsible for chewing, phonetics, space maintenance, aesthetics and self-esteem, and psychological well-being. They are an essential component of overall health, and affect the quality of life [16].

Severely infected primary teeth from early childhood caries (ECC) cause pain and disfigurement making children uncooperative for comprehensive treatment, and sometimes requiring general anaesthesia (GA). Treating children under GA is not without risks. In addition, very few dentists are willing to perform treatment on such young children because it is time-consuming, not financially rewarding, and they do not have sufficient experience [17, 18]. According to Brunei’s National Oral Health Survey (2014-2017) on children, one in 10 had never visited a dental provider and 12% had visited because of pain [19].

Prevention of ECC was found to be associated with parental factors. Parents with good educational backgrounds had more favorable oral health knowledge, and their children had better oral hygiene behavior than those without [20]. Highly educated mothers showed a better understanding of oral hygiene and the importance of primary teeth compared with low-educated mothers [21]. Parents’ oral health awareness and oral health related habits were directly related to their children’s dental health [21, 22]. Hooley et al. (2012) emphasized the role of socioeconomic status, such as low family income, unemployment, and parental education level, in caries development in children [23]. Moreover, Graesser et al. (2022) and Lam et al. (2022) corroborated these findings, highlighting that children from socioeconomically disadvantaged backgrounds had higher levels of dental caries [12, 24]. Lam et al. (2022) further delineated parental education levels as a key predictor of early childhood caries increment. Children whose parents have a low education level are more likely to have a greater increment of ECC [24].

Parents play a crucial role in preventing ECC in their children. This is because children tend to adopt their parents’ oral health habits, which they carry into their adulthood [25]. As part of UNICEF’s third goal to ensure healthy living and promote well-being for people of all ages. ECC should be addressed to improve the overall health of children and parents. To achieve this, health education and community engagement are necessary. Educating parents about ECC and its prevention can increase their knowledge and awareness of oral health, which can lead to better oral health practices. This, in turn, can improve the oral health of both parents and children. By raising parents’ awareness of oral health and ECC prevention via providing parents with sound information about ECC and its intervention, parents’ knowledge, attitude, and practices toward oral health can be improved [26]. As a result, both parents and children can have a better quality of life. This is in line with the second goal under Wawasan Brunei 2035 Framework [27].

Currently, only one study conducted in Brunei Darussalam by Chiau et al. (2021) examined the relationship between parents’ knowledge, attitude, and practice in preventing ECC. The study concluded that although parents with good knowledge about oral health may not necessarily have better attitudes or practices toward it [28]. This finding is in contrast to previous studies conducted in different countries, which found a positive correlation between parents’ oral health knowledge, attitudes, and practices [20, 21, 29]

To confirm the difference observed by Chiau et al. (2021), this study aimed to assess the effect of current oral health knowledge, attitude, and practice (KAP) of parents on their children [28]. Specifically, this study aimed to assess the effect of the parental oral health knowledge, attitude, and practice on their children. The objectives for this study included (1) to assess the parents’ oral health knowledge, attitude, and practice, and (2) to determine the relationship

between the level of parental KAP and their demographic variables such as gender, age, education level, employment status, family income and number of children.

2. MATERIAL AND METHODS

2.1 Study Design and Population Selection

This study was carried out as a cross-sectional study among parents or caregivers of children below 6 years old between the period of January 2024 and March 2024. A self-administered questionnaire was distributed to the parents who attend the government Maternal and Child clinics in Tutong and Belait Districts. A total of 6 clinics were included in the study. The clinics included were Tutong MCH clinic, Sungai Kelugos MCH clinic, Lamunin MCH clinic, Telisai MCH clinic, Sungai Liang MCH clinic, and Suri Seri Begawan MCH clinic.

Inclusion Criteria:

All parents or caregivers attend appointments in Belait and Tutong Districts, between period of January 2024 and March 2024.
Parents or caregivers who have a child below 6 years old.

Exclusion Criteria

Illiterate parents or caregivers.
Parents or caregivers who participated in the pre-test

A pre-test using a purposive sample of 10 parents or caregivers was conducted to assess the feasibility and clarity of the questionnaire. Up to 3 cycles of pretests were conducted to ensure that the questionnaire can be fully understood. The inclusive and exclusive criteria for the pre-test were similar to the study. After each cycle of the pretest, the words that participants suggested were taken into consideration, and amendments were made to improve the comprehensibility of the questionnaire.

2.2 Sampling and Sample size

A sample size of at least 369 participants is required to achieve precision of 5% with an expected proportion of 60-74% with 95% CI [30]. Calculations were done using the Sample Size for Studies [31]. To minimize bias due to missing data and non-response, data needs to be collected from a minimum of 600 participants. The estimated number of eligible parents in the study period is 17 400. Systemic sampling was used in sampling. Every 4th in 29 patients were asked to participate in the study. Systemic sampling done using RANDOM.ORG [50].

2.3 Research instrument

A review was conducted to identify the best methods and standard procedures from previous studies in assessing the effect of parental oral health knowledge, attitude, and practice on their children. Only 5 studies were chosen for this review [30,33,34,35,36]

A self-administered structured questionnaire with four sections was utilized in this study. Items used in the questionnaire were adapted from previous studies selected in the literature review, with modifications related to the number of items and response option. The items chose for this questionnaire were readily available in the published studies. The questions were distributed in both English and Malay versions. The translation was done according to WHO guidelines (WHODAS 2.0) [32]. The English versioned questionnaire was translated to Malay

languages. This was done with the help of 2 dental nurses and a Malay tutor who are fluent in both English and Malay languages. These questionnaires were later back-translated in English and verified with the original English questionnaire by another dental nurse and English tutor who are fluent in both English and Malay languages

2.4 Data Analysis

The sociodemographic variables were described as counts and percentages.

For the oral health knowledge, the correct response to each item was considered a "correct" answer, and "I don't know" and wrong responses to each item were considered "incorrect" answers. The correct answers were described as counts and percentages. This was done the same for attitude and practice domains.

For further analysis, the level of KAP was graded as "pass" or "fail" for each participant. The percentage of correct answers for each domain was calculated by dividing the number of correct answers to the maximum possible number of correct answers multiplied by 100. As parents or caregivers should have at least some basic oral health knowledge, attitude, and practice, a percentage of 60 or below was considered as "fail" and those above 60% was considered as "pass". Those who were graded "fail" in knowledge means they have lower oral health knowledge. Those who were graded "pass" in knowledge means they have higher oral health knowledge. These interpretations were the same for the other two domains. The number of "pass" and "fail" were described as counts and percentage for each domain.

Associations between the sociodemographic variables and the grade of each domain were determined using the chi-squared test. The association between the sociodemographic variable and KAP grades were also analyzed using simple and multiple logistic regression.

All the data collected were analyzed using R-studio (for Mac) Version 2022.12.0+353. P value less than 0.05 were considered statistically significant.

3. RESULTS AND DISCUSSION

A total of 631 participants were invited to participate, 26 refused to participate and 59 did not complete the questionnaire. After excluding those refused and incomplete, 546 participants were included in this analysis (86.4% response rate).

Table 1 shows the demographic characteristics of the participants. 81.7% of the participants were female, 55.9% were more than 30 to 40 years old, 47.4% had an education level of secondary school, 61.2% were working, 45.1% had a family income of BND1000-BND3000, and 61.8% have 1-2 children.

Table 1: Sociodemographic characteristics of parents (*n* = 546)

Variables	N (%)
Gender	
Female	446 (81.7)
Male	100 (18.3)
Age (years)	
Below 20	13 (2.4)

20 to 30	183 (33.5)
30 to 40	305 (55.9)
More than 40	45 (8.2)
Education level	
None	12 (2.2)
Less than primary school	4 (0.7)
Secondary school	259 (47.4)
College or Diploma	152 (27.8)
Bachelor degree or higher	97 (17.8)
Certificate level	22 (4.0)
Employment status	
Working	334 (61.2)
Non- working	212 (38.8)
Family income (BND)	
Less than BND 1000	225 (41.2)
BND 1000- BND 3000	246 (45.1)
More than BND 3000	75 (13.7)
Number of children	
1-2	337 (61.7)
3-4	151 (27.7)
5 or more	58 (10.6)

Table 2 displays the extent of parental knowledge regarding oral health. Parents are well-aware that brushing baby's teeth is important, cleaning their baby's mouth should begin even before teeth erupt, taking their child for dental check-ups during their first year of life is important, even if they don't have any tooth decay or pain, and frequent consuming sugary foods during the day can increase the likelihood of tooth decay with 97.8%, 94.3%, 94.9% and 90.8% of parents scoring on these items respectively.

Table 2: Level of parental oral health knowledge

Items	**Correct N (%)**
Brushing baby's teeth is important	534 (97.8)
Dental checkup at the first year of your child life is important even if child does not have tooth decay or tooth pain	518 (94.9)

Cleaning baby's mouth should begin even before teeth erupt	515 (94.3)
High sugary intake frequency during the day can affect tooth decay	496 (90.8)
Tooth decay can affect infants below 2 years old	474 (86.8)
Fluoride in toothpaste helps to prevent dental caries in children	456 (83.5)
Fluoride in toothpaste helps to prevent dental caries in children	456 (83.5)
Bacteria can be transmitted from mother to baby through sharing feeding utensil such as spoons	436 (79.9)
Primary teeth is as important as permanent teeth	426 (78.0)
Feeding your child with baby bottle at nighttime has an influence on child teeth	314 (57.5)
Appearance of white lines or white spots on the surfaces of the teeth are the first signs of tooth decay	272 (49.8)

Table 3 illustrates the parents' attitude towards oral health. 99.6% of parents agreed that it is their responsibility to maintain their child's oral health is the parent's responsibility. 89% 89% of parents also agreed that baby teeth should be cleaned as soon as they erupt.

Table 3: Level of parental oral health attitude

Items	**Correct N (%)**
Maintaining the child oral health is the parent's responsibility	544 (99.6)
Baby teeth should be cleaned as soon as it erupts	486 (89.0)
Children at the age of 6 and below can brush their own teeth without the help of parents/ caregiver	263 (48.2)
Frequent and prolonged breast/ bottle feeding causes harm to your child's teeth	207 (37.9)

Children should only visit the dentist by the age of 2	136 (24.9)
Providing fresh juices frequently during the day can harm your child's teeth	128 (23.4)

Table 4 illustrates the parental oral health practices. 99.8% of parents believe that they should improve their knowledge of oral health. 94.1% of the parents recognised the importance of a balanced diet is maintaining their children's oral health.

Table 4: Level of parental oral health practices

Items	Correct N (%)
Parents should try to improve their knowledge in oral health	545 (99.8)
Balanced diet is necessary for your child oral health	514 (94.1)
Visit dentist once every 6 months is important in preventing tooth decay	485 (88.8)
Cleaning your child's teeth after each meal is necessary	469 (85.9)
Providing breast feeding/bottle feeding during bedtime could harm your child teeth	259 (47.4)
Sugary food should only be given to your child before going to bed	99 (18.1)

Tables 5 shows the number of "pass" and "fail" in each domain.93.0% of parents have good oral health knowledge, 45.1% of parents have good oral health attitude, and 95.1% of parents have good oral health practices.

Table 5: The number of "pass and fail" in each domain (KAP)

Domains	Pass N %	Fail N %
Knowledge	508 (93.0)	38 (0.7)
Attitude	246 (45.1)	300 (54.9)
Practices	519 (95.1)	27 (4.9)

Table 6 illustrates the factor associated with oral health knowledge using Chi-square test. The test found that the level of oral health knowledge was significantly related to parental age ($P < 0.001$). Oral health knowledge varies significantly across different age groups of parents.

Table 6: Factors associated with oral health knowledge

Variable	n	Pass N (%)	Fail N (%)	X^2 statistic[a] (df)	P value[a]
Gender					
Female	446	419 (94.0)	27 (6.1)	3.09 (1)	0.079
Male	100	89 (89.0)	11 (11.0)		
Age (years)					
Below 20	13	12 (100.0)	0 (0.0)	17.69 (3)	0.001*
20 to 30	183	159 (86.9)	24 (13.1)		
30 to 40	305	291 (95.4)	14 (4.6)		
More than 40	45	45 (100.0)	0 (0.0)		
Education level					
None	12	10 (83.3)	2 (16.7)	8.58 (5)	0.127
Less than primary school	4	4 (100.0)	0 (0.0)		
Secondary school	259	236 (91.1)	23 (8.9)		
College or Diploma	152	145 (95.4)	7 (4.6)		
Bachelor degree or higher	97	94 (96.9)	3 (3.1)		
Certificate level	22	19 (86.4)	22 (4.0)		
Employment status					
Working	334	310 (92.8)	24 (7.2)	0.07 (1)	0.795
Non- working	212	198 (93.4)	14 (6.6)		
Family income (BND)					
Less than BND 1000	225	206 (91.6)	19 (8.4)	1.35 (2)	0.508
BND 1000- BND 3000	246	231 (93.9)	15 (6.1)		
More than BND 3000	75	71 (94.7)	4 (5.3)		
Number of children					
1-2	337	310 (92.0)	27 (8.0)	3.058(2)	0.217
3-4	151	141 (93.4)	10 (6.6)		
5 or more	58	57 (98.3)	1 (1.7)		

[a] Chi-square test for independence; * Statistical significance at 0.05

Table 7 displays the factor associated with oral health attitude using Chi-square test. The analysis showed that the parental gender, education level, and income level significantly influenced the level of oral health attitude ($P < 0.001$). The test revealed a significant difference in oral health attitudes between male and female parents, as well as parents with varying level of education and income.

Table 7: Factors associated with oral health attitudes.

Variable	n	Pass N (%)	Fail N (%)	X^2 statistic[a] (df)	P value[a]
Gender					
Female	446	215 (48.2)	231 (51.8)	9.77 (1)	0.002*
Male	100	31 (31.0)	69 (69.0)		
Age (years)					
Below 20	13	4 (30.8)	9 (69.2)	3.51 (3)	0.319

20 to 30	183	76 (41.5)	107 (58.5)		
30 to 40	305	142 (46.6)	163 (53.5)		
More than 40	45	24 (53.3)	21 (46.7)		
Education level					
None	12	5 (41.6)	7 (58.3)	15.99 (5)	0.007*
Less than primary school	4	2 (50.0)	2 (50.0)		
Secondary school	259	100 (38.6)	159 (61.4)		
College or Diploma	152	67 (44.01)	85 (55.9)		
Bachelor degree or higher	97	59 (60.8)	38 (39.2)		
Certificate level	22	13 (59.1)	9 (40.9)		
Employment status					
Working	334	154 (46.1)	180 (53.9)	0.39 (1)	0.535
Non- working	212	92 (43.4)	120 (56.6)		
Family income (BND)					
Less than BND 1000	225	97 (43.1)	128 (56.9)	7.88(2)	0.019*
BND 1000- BND 3000	246	104 (42.3)	142 (57.7)		
More than BND 3000	75	45 (60.0)	30 (40.0)		
Number of children					
1-2	337	150 (44.5)	187 (55.5)	0.15 (2)	0.930
3-4	151	70 (46.4)	81 (53.6)		
5 or more	58	26 (44.8)	32 (55.2)		

[a] Chi-square test for independence; * Statistical significance at 0.05

Table 8 shows the factor associated with oral health knowledge using Chi-square test. According to the test, the level of oral health practices was not significantly related to any parental factors.

Table 8: Factors associated with oral health practice

Variable	n	Pass N (%)	Fail N (%)	X^2 statistic[a] (df)	P value[a]
Gender					
Female	446	425 (95.3)	21 (4.7)	0.29 (1)	0.590
Male	100	94 (94.0)	6 (6.0)		
Age (years)					
Below 20	13	11 (84.6)	2 (15.4)	6.67 (3)	0.083
20 to 30	183	171 (93.4)	12 (6.6)		
30 to 40	305	292 (95.7)	13 (4.3)		
More than 40	45	45 (100)	0(0.0)		
Education level					
None	12	10 (83.3)	2 (16.7)	5.72 (5)	0.335
Less than primary school	4	4 (100.0)	0 (0.0)		
Secondary school	259	254 (94.6)	14 (5.4)		
College or Diploma	152	1144 (94.7)	8 (5.3)		
Bachelor degree or higher	97	94 (96.9)	3 (3.1)		
Certificate level	22	22 (100.0)	0 (0.0)		

Employment status					
Working	334	321 (96.1)	13 (3.9)	2.03 (1)	0.154
Non- working	212	198 (93.4)	14 (6.6)		
Family income (BND)					
Less than BND 1000	12	208 (92.4)	17 (7.6)	5.59 (2)	0.061
BND 1000- BND 3000	4	238 (96.8)	8 (3.3)		
More than BND 3000	259	73 (97.3)	2 (2.7)		
Number of children					
1-2	337	315 (93.5)	22 (6.5)	4.89 (2)	0.087
3-4	151	148 (98.0)	3 (2.0)		
5 or more	58	56 (96.6)	2 (3.5)		

[a] Chi-square test for independence; * Statistical significance at 0.05

Table 9 presents the logistic regression results for factors related to parental oral health knowledge. In the simple logistic regression (SLR), parental age was found to be significantly associated with oral health knowledge, with parents between the age of 30-40 being more likely to have good oral health knowledge than those below 30 and above 40 (Odds Ratio [OR] = 0.32, 95% Confidential Interval [CI] = 0.16-0.63).

In multiple logistic regression (MLR), parental age and education level were significantly associated with good oral health knowledge. Parents between the ages of 30 to 40 were more likely to have good oral health knowledge compared to those below 30 and above 40 (OR=0.36, 95% CI= 0.16-0.76). Parents with College or Diploma and Bachelor degree or higher background were more likely to have good oral health knowledge compared to those without (OR=0.09, 95% CI=0.01-0.78 for College or Diploma; OR=0.07, 95% CI= 0.01-0.68 for Bachelor degree or higher).

Table 10 presents the logistic regression results for factors associated with parental oral health attitude. Parental gender and family income were significantly associated with good oral health attitudes in SLR. Male parents were found to have better oral health attitudes than female parents (OR=2.07, 95% CI= 1.31-3.33). Additionally, parents with a family income of more than BND 3000 were more likely to have better oral health attitudes than those with a family income below BND 3000 (OR=0.51, 95% CI= 0.29-0.86). In MLR, only parental gender was found to be statistically associated with good oral health attitudes. Male parents were more likely to have good oral health attitudes than female parents (OR=2.11, 95% CI=1.30-3.50).

Table 11 displays the logistic results of the factors related to oral health practice. Parental family income and the number of children were found to be statistically associated with good oral health practice in SLR. Parents with a family income between BN1000 and 3000 are more likely to have better oral health practices than those below BN1000 and above BND3000 (OR=0.41, 95% CI =0.16-0.94). Additionally, parents with 3-4 children are more likely to have better oral health attitudes than those with less than 3 or more than 4(OR=0.29, 95% CI=0.07-0.85). For the MLR, only parents with 3-4 children were statistically associated with better oral health practices (OR=0.28, 95% CI= 0.06-0.86)

Table 9: Factors associated with oral health knowledge (using simple and multiple logistic regression)

Variables	Crude *OR* (95% CI OR)	Z stat.	*P* value	Adj. *OR* (95% CI OR)	Z stat.	*P* value
Gender						
Female[a]	1.00			1.00		
Male	1.92(0.88, 3.91)	1.73	0.084	1.64(0.68,3.77)	1.14	0.253
Age (years)						
Below 20	0.00	-0.01	0.993	0.00	-0.01	0.992
20 to 30[a]	1.00			1.00		
30 to 40	0.32(0.16,0.63)	-3.26	0.001*	0.36(0.16,0.76)	-2.64	0.008*
More than 40	0.00	-0.02	0.986	0.00	-0.02	0.986
Education level						
None[a]	1.00			1.00		
Less than primary school	0.00	-0.02	0.985	0.00	-0.01	1.00
Secondary school	0.49(0.12,3.29)	-0.89	0.372	0.20(0.03,1.57)	-1.73	0.083
College or Diploma	0.24(0.05,1.76)	-1.64	0.101	0.09(0.01,0.78)	-2.42	0.016*
Bachelor degree or higher	0.16(0.02,1.32)	-1.89	0. 059	0.07(0.01,0.68)	-2.43	0.016*
Certificate level	0.79(0.11,6.74)	-0.24	0.812	0.30(0.03,3.30)	-1.04	0.299
Employment status						
Working	1.09(0.56, 2.22)	0.26	0.795	1.34(0.59,3.11)	0.70	0.487
Non- working[a]	1.00			1.00		
Family income (BND)						
Less than BND 1000[a]	1.00			1.00		
BND 1000- BND 3000	0.70(0.34, 1.42)	-0.98	0.328	0.89(0.38,2.02)	-0.29	0.773
More than BND 3000	0.61(0.17, 1.69)	-0.87	0.385	1.32(0.30,4.86)	0.40	0.691
Number of children						
1-2[a]	1.00			1.00		
3-4	0.82(0.37, 1.68)	-0.54	0.593	1.10(0.46,2.47)	0.21	0.831
5 or more	0.20(0.01, 0.98)	-1.56	0.119	0.33(0.02,1.85)	-1.03	0.303

[a] Reference category

Table 10: Factors associated with oral health attitude (using simple and multiple logistic regression)

Variables	Crude *OR* (95% CI OR)	Z stat.	*P* value	Adj. *OR* (95% CI OR)	Z stat.	*P* value
Gender						
Female[a]	1.00			1.00		
Male	2.07(1.31,3.33)	3.09	0.002*	2.11(1.30,3.50)	2.95	0.003*
Age (years)						
Below 20	1.60(0.50,6.07)	0.76	0.449	1.55(0.43,6.56)	0.65	0.513
20 to 30[a]	1.00			1.00		
30 to 40	0.82(0.56,1.18)	-1.08	0.280	0.90(0.60,1.35)	-0.59	0.604
More than 40	0.62(0.32,1.20)	-1.42	0.155	0.68(0.33,1.46)	-0.96	0.335
Education level						
None[a]	1.00			1.00		
Less than primary school	0.71(0.07,7.69)	-0.29	0.772	0.89(0.07,10.66)	-0.10	0.923
Secondary school	1.14(0.33,3.65)	0.21	0.832	1.44(0.38,5.44)	0.55	0.580
College or Diploma	0.91(0.26,2.96)	-0.16	0.871	1.10(0.28,4.32)	0.14	0.889
Bachelor degree or higher	0.46(0.13,1.54)	-1.25	0. 211	0.65(0.16, 2.69)	-0.60	0.549
Certificate level	0.49(0.11,2.04)	-0.97	0.334	0.57(0.12,2.74)	-0.70	0.484
Employment status						
Working	0.90(0.63,1.27)	-0.62	0.535	0.98(0.59,1.32)	-0.63	0.533
Non- working[a]	1.00			1.00		
Family income (BND)						
Less than BND 1000[a]	1.00			1.00		
BND 1000- BND 3000	1.03(0.72,1.49)	0.18	0.855	1.29(0.83,2.00)	1.14	0.255

More than BND 3000	0.51(0.29,0.86)	-2.52	0.012*	0.92(0.47,1.82)	-0.24	0.812
Number of children						
1-2[a]	1.00			1.00		
3-4	0.93(0.63,1.40)	-0.38	0.705	0.97(0.64,1.49)	-0.12	0.903
5 or more	0.99(0.57,1.74)	-0.05	0.964	1.06(0.57,2.02)	0.19	0.848

[a] Reference category

Table 11: Factors associated with oral health practice (using simple and multiple logistic regression)

Variables	**Crude *OR* (95% CI OR)**	**Z stat.**	***P* value**	**Adj. *OR* (95% CI OR)**	**Z stat.**	***P* value**
Gender						
Female[a]	1.00			1.00		
Male	1.29(0.46,3.11)	0.54	0.591	1.30(0.42,3.61)	0.49	0.625
Age (years)						
Below 20	2.59(0.37,11.17)	1.15	0.248	1.32(0.13,8.15)	0.28	0.784
20 to 30[a]	1.00			1.00		
30 to 40	0.63(0.28,1.44)	--1.11	0.269	1.00(0.41,2.44)	-0.01	0.995
More than 40	0.00	-0.02	0.987	0.00	-0.01	0.992
Education level						
None[a]	1.00			1.00		
Less than primary school	0.00	-0.01	0.996	0.00	0.00	0.997
Secondary school	0.29(0.07,1.97)	-1.52	0.127	0.50(0.08,4.85)	-0.68	0.500
College or Diploma	0.28(0.06,2.00)	-1.50	0.134	0.64(0.09,7.08)	-0.41	0.686
Bachelor degree or higher	0.16(0.02,1.32)	-1.89	0.059	0.47(0.05,6.41)	-0.61	0.551
Certificate level	0.00	-0.01	0.9903	0.00	-0.01	0.994
Employment status						
Working	0.57(0.26, 1.25)	-1.41	0.159	0.83(0.33,2.10)	-0.39	0.694
Non- working[a]	1.00			1.00		

Family income (BND)						
Less than BND 1000[a]	1.00			1.00		1.00
BND 1000- BND 3000	0.41(0.16, 0.94)	-2.02	0.043*	0.37(0.13,1.01)	-1.90	0.058
More than BND 3000	0.34(0.05, 1.21)	-1.44	0.150	0.36(0.05,1.75)	-1.15	0.252
Number of children						
1-2[a]	1.00			1.00		
3-4	0.29(0.07, 0.85)	-1.98	0.047*	0.28(0.06,0.86)	-1.98	0.048*
5 or more	0.51(0.08, 1.80)	-0.89	0.373	0.53(0.08,2.21)	-0.78	0.433

[a] Reference category

4. DISCUSSION

Parents play vital models in shaping their children's behaviour and habits, including their oral health practices [37]. When parents have good oral knowledge, attitude, and practice related to oral health, they can instill the same in their children [38]. From this study, over 90% of the participants understood the importance of brushing their children's teeth and starting cleaning even before their teeth have erupted. They recognized the significance of taking their children for dental check-ups in the first year of their life, regardless of their caries status. Additionally, they were aware of the harmful effects of high sugar intake frequency during the day on their children's teeth. These findings are consistent with Chiau et al. (2021), and Al-Jaber et al. (2022), but not with Ashkanani and Al-Sane (2013) [28,36,39]. Parental knowledge on oral health is important as parents play a role in developing healthy oral habits for their children by modeling healthy behaviors [45,46,.47].

More than 90% of the parents in this study considered it their responsibility to maintain their child's oral health and agreed that baby teeth should be cleaned as soon as they erupt. They also believed in improving their knowledge of oral health and that a balanced diet is necessary for their children's oral health. These findings were consistent with Chiau et al. (2021), and Al-Jaber et al. (2022) [28, 36]. Overall, most parents in this study had adequate oral health knowledge, attitude, and practice, which is essential for preventing caries in children. However, many parents are still unaware that the consumption pattern of bottle-feeding and fruit juice could cause harm to their children's teeth.

In this study, the parental age and education level were found to be significantly associated with good oral health knowledge. These findings are similar to Schwendicke et al. (2015), and Chen et al. (2020) [20,40]. People with lower education tend to have poorer health literacy, and dietary and oral health behaviors, which can lead to poorer oral health practices. However, this finding contradicts Al-Jaber et al. (2022). [36]

Our study found a significant relationship between parental gender and oral health attitudes, with male parents more likely to exhibit good oral health attitudes compared to female parents. This finding, which contrasts with previous studies by Ashkanani and Al-Sane (2013) and Al-Jaber et al. (2022) [36, 39], underscores the need for further research. Guerra et al. (2017) reported no significant difference in oral health attitude based on parental gender, adding to the lack of consistent findings in prior research [36, 39]. On the other hand, Guerra et al. (2017) reported no significant difference in oral health attitude based on parental gender. Given the lack of consistent findings in prior research, it is recommended to conduct further studies to explore this relationship [41].

Furthermore, this study uncovered a statistically significant association between parents with 3-4 children and enhanced oral health practices. This finding aligns with that of Al-Malik et al. (2001) [42]. However, this finding diverges from the results of Ashkanani and Al-Sane (2013), as well as Saldūnaitė et al. (2017) [39,43], which found that parental knowledge as a predictor of favourable oral health practices. A plausible explanation for this phenomenon is that parents with more than 1-2 children may have participated in preventive programs, consequently increasing their likelihood of being informed more and adhering to good oral health practices.

In summary, the findings of this study offer valuable insights into knowledge, attitude and practices of the parents with children below the age of 6. Leveraging this data, public health team could plan and implement appropriate early prevention strategies to enhance children's oral health in Brunei, with parents serving as crucial role models. ECC has a negative impact on the oral health related quality of life of both children and their families [48,49,50,52]. In addition, parents with lower oral health literacy had a greater odd of having children with untreated dental caries [51]. By addressing ECC, Brunei stands a better chance of fulfilling UNICEF's third goal, which focuses on promoting healthy living and well-being across all age groups. Tackling ECC not only improves children's overall health but also benefit parental well-being. By increasing the level of oral health knowledge, attitudes, and practice, both parents and children are poised to enjoy better health outcomes, aligning with the objectives outlines in Wawasan Brunei 2035 Framework aimed at fostering a high quality of life.

4.1 Limitations and recommendation

The limitation of this study was that the questionnaire is self-reported, which may be susceptible to recall bias leading to incorrect classification. As the participants were mostly female, there is possibility of gender bias. The cross-sectional study design constrained the potential to establish a causal relationship. As the study was conducted only in two districts, the findings of this study can only be used to generalize for these two districts. Further studies are recommended to include dental examination of the children to determine the effects of parental knowledge, attitude, and knowledge more accurately.

5. CONCLUSION

Parental characteristics play a crucial role in shaping children's oral health knowledge, attitude and practice. Therefore, health promotion teams should focus on motivating parents to improve their own oral health knowledge, attitude and practice, which would not only benefit their own oral health but also their children's

Consent and ethical approval.

Ethical approval was granted by the joint IHSREC-MHREC committee, and permission to conduct the study was obtained from BREU. Only participants who provided their consent were included in the study, and personal identification information was not collected.

CONSENT (WHERE EVER APPLICABLE)

No manuscripts will be peer-reviewed if a statement of patient consent is not presented during submission (wherever applicable).
This section is compulsory for medical journals. Other journals may require this section if found suitable. It should provide a statement to confirm that the patient has given their informed consent for the case report to be published. Journal editorial office may ask the copies of the consent documentation at any time.

Authors may use a form from their own institution or SDI Patient Consent Form 1.0. It is preferable that authors should send this form along with the submission. But if already not sent during submission, we may request to see a copy at any stages of pre and post publication.

If the person described in the case report has died, then consent for publication must be collected from their next of kin. If the individual described in the case report is a minor, or unable to provide consent, then consent must be sought from their parents or legal guardians.

Authors may use the following wordings for this section: "All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal."

ETHICAL APPROVAL (WHERE EVER APPLICABLE)

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