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Associations between early-life behaviours, current oral health behaviours and oral health among children in Brunei Darussalam and the recommendations for oral health prevention strategies

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Declaration

As the principal investigator, I hereby declared that the work presented in this thesis is entirely my own. All information and data derived from other sources have been appropriately acknowledged and cited within the thesis.

A handwritten signature in blue ink, appearing to be 'J. J. J.', is located in the bottom right area of the page.

Abstract

Background: There is limited evidence of inequalities in dental caries in deciduous dentition among children in Brunei Darussalam. Moreover, there is no evidence assessing the associations of early-life behaviours and current oral health behaviours with the prevalence and severity of caries experience among these children.

Aims: The primary aims were: 1) to examine the prevalence of caries experience (i.e., prevalence of dmft > 0) and the severity of caries experience (i.e., mean dmft) in 5-year-old children participating in the 2015 Child National Oral Health Survey (CNOHS) and current oral epidemiological surveys; 2) to assess the associations of early-life and current oral health behaviours with dental caries experience among children aged 5 years during the two surveys. Meanwhile, the secondary aims were 1) to assess the associations of sociodemographic characteristics with dental caries experience in 5-year-old children during both surveys; and 2) to provide recommendations for oral health prevention strategies to be implemented for child population in Brunei Darussalam.

Methods: Study 1 involved conducting a secondary analysis of all data related to 355 children aged 5 years from the 2015 CNOHS dataset. Study 2 involved primary data collection through an oral epidemiological survey in 2023, comprising of a parental questionnaire and dental examination of 345 children aged 5 years in Brunei Darussalam, followed by data analysis. In both studies, descriptive analysis and regression analyses (logistic and zero-inflated negative binomial) were used to explore the associations of caries experience with oral health behaviours, adjusting for sex, district, school type, parental education and household income. In study 3, in-depth interviews with 5 parents from varying backgrounds were conducted using semi-structured questions to investigate parents' understanding of the associations between children's oral health and their oral health behaviours. The interview data was analysed thematically to generate key themes and subthemes.

Results: The prevalence of 5-year-old children with caries experience in 2015 was 73.2%, with a mean dmft of 5.12. In 2023, a lower prevalence was identified as 59.0%, with a mean dmft of 3.63. Although the analysis in Study 1 only identified significant associations of caries experience with school types and ethnic background, Study 2 revealed additional significant associations with parental education level and household income. These two studies also demonstrated that caries experience in children was significantly associated with the age of stopping breastfeeding, the frequency of daily sugary sweetened beverages (SSB) consumption, age of started toothbrushing, the status of parental supervision during the ages of 2 to 3, frequency of daily brushing at ages 2 to 3 and 5, the type and quantity of toothpaste used, as well as the age of started dental visits.

Study 3 further explored these associations and found that parents had a good understanding of the associations between children's oral health and their oral health behaviours. These oral health behaviours included using the correct amount of toothpaste, brushing teeth twice daily, ensuring proper brushing duration, monitoring oral hygiene after brushing and attending the preventive dental visits. Additionally, these parents recognised the importance of other oral health behaviours for maintaining good oral health, such as consuming healthy beverages and foods, using feeder cups before age 1, giving water after breastfeeding and offering appropriate bottle contents.

Conclusion: The thesis results showed a significant reduction in caries experience among 5-year-old children in Brunei Darussalam from 2015 to 2023. Considering that the surveys were conducted on two different groups of children, results on decreasing prevalence and severity of caries experience should be reported with caution. These findings, together with the significant associations between caries experience and various sociodemographic factors and oral health behaviours, highlight the need for comprehensive dental public health strategies. Such strategies should aim to improve children's oral health and reduce oral health inequalities across different sociodemographic groups by raising oral health awareness among parents.

Keywords: dental public health, oral health promotion, young children, dental caries, oral health behaviours.

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Abbreviations

ARCPH	: Australian Research Centre for Population Oral Health
BASCD	: British Association Study of Community Dentistry
CENTRAL	: Cochrane Central Register of Controlled Trials
CDHS	: Child Dental Health Survey
CI	: Confidence interval
CNOHS	: Child National Oral Health Survey
CPITN	: Community Periodontal Index of Treatment Needs
dmfs	: Decayed, missing and filled surface in deciduous dentition
DMFS	: Decayed, missing and filled surface in permanent dentition
dmft	: Decayed, missing and filled teeth in deciduous dentition
DMFT	: Decayed, missing and filled teeth in permanent dentition
DPIA	: Data Protection Impact Assessment
FHS REC	: Faculty of Health Sciences Research Ethics Committee
GDPR	: General Data Protection Regulation
GDP	: Gross Domestic Product
HIC	: High-income countries
IRR	: Incidence rate ratio
IMD	: Index of Multiple Deprivation
LIC	: Low-income countries
LMIC	: Lower-middle-income countries
MCH	: Maternal and Child Health
MOH	: Ministry of Health
NCD	: Non-communicable diseases
NHS	: National Health Service
NMES	: Non-milk extrinsic sugars
OHRQoL	: Oral health-related quality of life
OR	: Odds ratio
pH	: Potential of hydrogen
PIL	: Participant information leaflet
ppm	: Parts per million
PR	: Predicted rate
RBAF	: Royal Brunei Armed Forces
SD	: Standard deviation
SSB	: Sugary sweetened beverage
TCD	: Trinity College Dublin
UCC	: University College Cork
UK	: United Kingdom
UMIC	: Upper-middle-income countries
US	: United States
WHO	: World Health Organisation

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Chapter 1

Introduction

1.1. Introduction

Dental caries represents a significant public health challenge worldwide [1, 2]. Despite being preventable, this oral disease has extensively impacted a substantial segment of the global population, including children. A 2019 systematic analysis examining the Global Burden of Disease estimated that there were 2.03 billion prevalent cases of dental caries in permanent teeth globally, marking it as one of the most common disease conditions. Additionally, there were 525 million prevalent cases of dental caries in deciduous teeth worldwide [1].

If dental caries is untreated, this condition can cause dental pain and negatively impact the individual's and parents' quality of life [3]. Factors from infancy through school age, such as breastfeeding and dietary habits, dental hygiene routines and dental visit patterns, all contribute to the risk of developing caries [4]. Despite the established understanding of the causes of dental caries, the condition is ubiquitous, affecting people of all ages globally, regardless of a country's wealth.

As a developed nation with a substantial gross domestic product (GDP) per capita, Brunei Darussalam faces ongoing challenges in enhancing children's dental health. Despite a decrease in the prevalence of caries experience among children, from 88.7% in 1999 to 66.1% in 2015, the rate remains high. Therefore, the Department of Dental Services strives to develop a national oral health plan aimed at improving dental services and preventive programmes for the population [5, 6].

Given the complex nature of the dental caries process, successful preventive strategies must be adapted to the specific needs of the population they aim to assist. There is no doubt that the current oral health prevention programmes for children in Brunei Darussalam are evidence based in terms of their effectiveness. However, the sustainability of these programmes is uncertain due to possible budget constraints in the future. Some previously implemented programmes have been discontinued due to resource limitations, despite evidence supporting their effectiveness [6].

In response to these challenges, this Clinical Doctorate thesis aims to clarify the oral health-related behaviours that may be associated to the development of caries. This thesis contributes to the evidence base for policy-making and preventive programme development in Brunei Darussalam. It also aims to provide actionable recommendations that can lead to sustainable improvements in the oral health of children, ultimately reducing the burden of dental caries in the country.

The initiation and implementation of this current thesis are direct outcomes of the recommendations made in the master's thesis of the principal investigator. This previous study assessed the role of oral health behaviours in the associations of the socioeconomic status with dental caries in children aged 5 to 15 years old, using data from the 2015 Brunei National Oral Health Survey. In conclusion, the previous thesis showed “clear socioeconomic inequalities in untreated caries among Bruneian children, but oral health behaviours (toothbrushing, dental attendance and sugar-sweetened beverages consumption) in the study did not have a significant role in explaining socioeconomic inequalities in untreated caries in children of Brunei Darussalam” [7]. Oral health behaviours are modifiable risk factors. Even if they did not account for socioeconomic differences, improving these oral health behaviours can still contribute to reducing caries prevalence and improving oral health outcomes in the population as a whole [8].

Therefore, this current thesis expands the assessment to explore the associations between caries experience of 5-year-old children in Brunei Darussalam and their oral health behaviours at ages 2 to 3 and 5 regardless of socioeconomic background, when analysed in the unadjusted models. This current thesis also explores parents' understanding of the associations between children's oral health behaviours and their oral health.

By adopting a more holistic approach, the thesis seeks to identify modifiable risk factors that can be targeted through preventive interventions. The findings are expected to provide recommendations for refining existing programmes or for developing previously implemented and new strategies to address oral health issues and their inequalities more effectively.

Despite resource limitations, the following cost-effective and accessible strategies can be considered to address the challenge of sustaining children's oral health preventive programmes in the country:

- To prioritise high-impact and low-cost interventions
- To utilise schools and community health centres as platforms for oral health education and preventive services
- To integrate oral health education into routine maternal and child health visits or other general health programmes
- To implement interventions for children at higher risk, such as those from low-income families

The COVID-19 pandemic significantly impacted the progression of this thesis, particularly in Study 2. Following the second wave of COVID-19, the uncertainty surrounding the resumption of routine dental services in Brunei Darussalam posed substantial challenges. The Department of Dental Services was cautious about allowing dental examinations on school children, given the need to minimise the risk of virus transmission and protect public health. This uncertainty created significant delays in data collection, as it was unclear when or if access to schools and dental services would be reinstated within the necessary timeframe. As a result, the continuation of Study 2 became increasingly risky, raising concerns regarding the feasibility of completing the data collection within the planned schedule.

To overcome these challenges, the principal investigator maintained regular communication with the Department of Dental Services to stay informed about policy changes and promptly resume in-person data collection as soon as conditions allowed. These proactive measures ensured the research could progress despite the disruptions, ultimately contributing important findings into the oral health behaviours of children during a period of unprecedented global health challenges.

1.2. Structure of thesis

The subsequent chapters of this thesis are organised as follows:

- **Chapter 2** provides the background for this thesis, covering the fundamental aspects of oral health and the progression and effects of dental caries. It examines the factors influencing dental caries and its impact on the daily lives of children and their families. Additionally, it provides an overview of Brunei Darussalam's dental healthcare system and the current oral health prevention strategies.
- **Chapter 3** reviews literature on the evidence of inequalities in dental caries among children within and outside Brunei Darussalam. It also explores the associations between early-life behaviours and current oral health behaviours with the prevalence and severity of dental caries in children.
- **Chapter 4** outlines the overall aims, objectives and research questions of the thesis.
- **Chapter 5** covers the first study of this thesis that involves a secondary analysis of cross-sectional quantitative data from the 2015 NOHS (Figure 1.1). This study aims to assess the prevalence and severity of caries experience across different sociodemographic characteristics and also assess the associations between oral health behaviours and caries experience in 5-year-old children.
- **Chapter 6** describes the second study of the thesis, which involves primary quantitative data collection through parental questionnaires and dental examinations of 5-year-old children in Brunei Darussalam in 2023. This chapter includes the subsequent analysis of the collected data to achieve similar aims as the first study, thereby complementing its findings.

- **Chapter 7** presents the third study of this thesis, which involves primary qualitative data collection through parental interviews. This study aims to explore parents' understanding of the associations between children's oral health and their oral health behaviours.
- **Chapter 8** reviews and discusses the overall results of the thesis from the three studies, highlights the methodological strengths and limitations. It then provides recommendations and actions for oral health prevention strategies to inform relevant stakeholders in Brunei Darussalam.
- **Chapter 9** concludes the overall findings of the thesis.

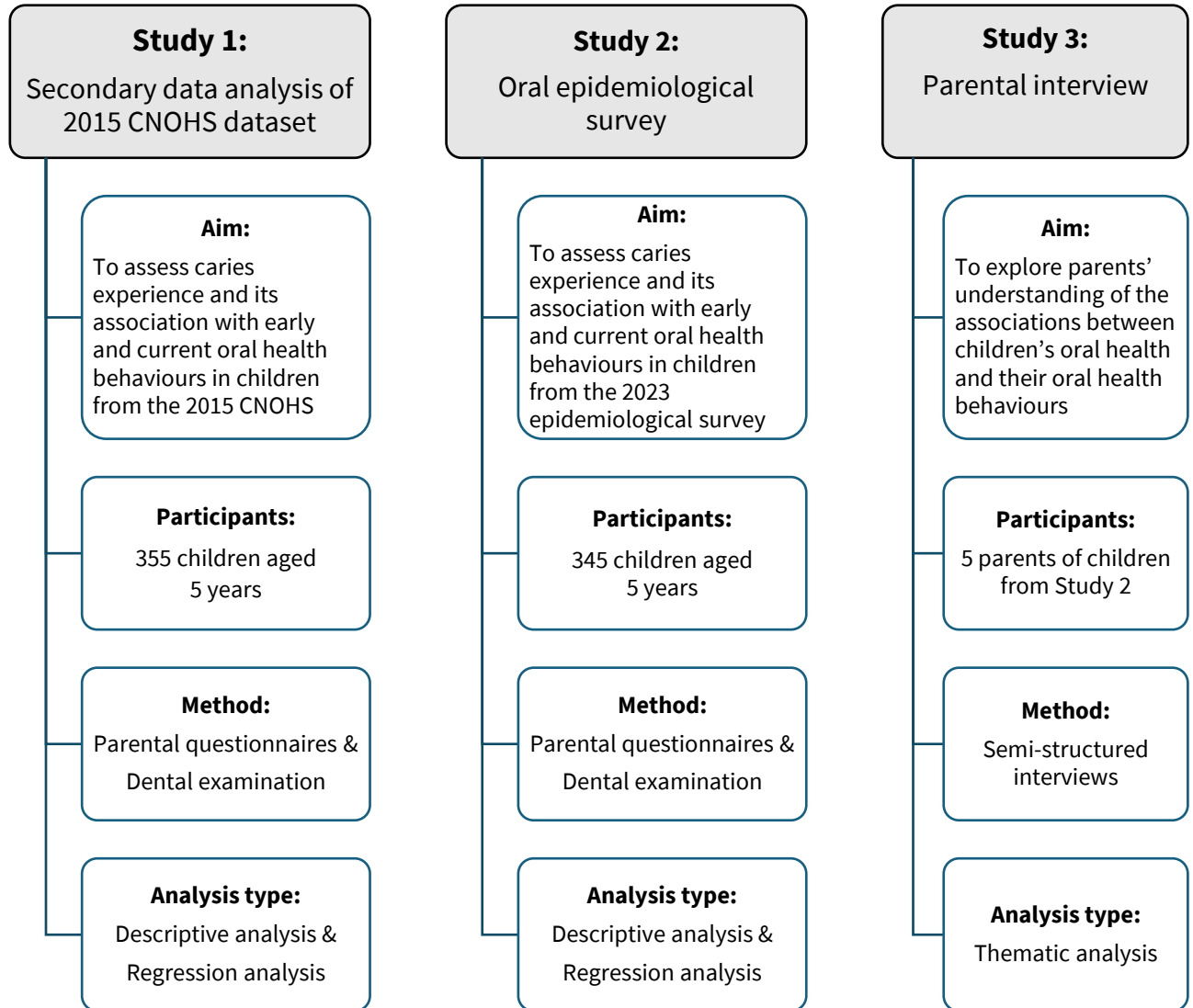


Figure 1.1 Three studies involved in this thesis and their components

Chapter 2

Background

2.1. Introduction

This chapter introduces the essential components of oral health and the development and impacts of dental caries. It then explores the determinants of dental caries and the impacts that caries has on the daily lives of children and their families. The chapter also presents an overview of Brunei Darussalam and its dental healthcare system, including current health prevention strategies implemented to address this widespread oral health issue.

2.2. Oral health

Oral health is a fundamental component of overall health and significantly influences physical, psychological and social well-being across all age groups, including children. It plays an important role not only in maintaining daily functionality and comfort but also impacts broader health outcomes and quality of life. According to the World Dental Federation, oral health is “multifaceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow and convey a range of emotions through facial expressions with confidence and without pain, discomfort and disease of the craniofacial complex” [9].

This definition emphasises the comprehensive nature of oral health, highlighting its importance not only in terms of dental hygiene but also including essential human functions and interactions [9]. Neglecting oral health can lead to a variety of oral diseases such as dental caries, periodontal diseases, oral cancers and dental erosion, each of which can significantly impair an individual's quality of life and overall well-being [10].

2.3. Dental caries and its development

Dental caries is “a disease that develops through gradual complex biological interactions of acidogenic bacteria, fermentable carbohydrates and host factors such as the teeth and saliva” [11]. Dental caries affects individuals throughout their lifetime. It is considered a childhood disease because it is closely linked to the period when teeth erupt and also to the increased vulnerability associated with this stage of development [11]. The condition begins to pose a risk early in life as the primary dentition start to erupt around 6 months of age. As children reach approximately 6 years old, these primary teeth begin to be replaced by permanent teeth. The susceptibility of teeth to dental caries begins after they emerge, affecting the visible tooth structures.

The pathogenesis of dental caries is influenced by a complex interaction of biological, physical, psychological, behavioural, social and environmental factors. Dental caries occurs when non-milk extrinsic sugars (NMES) from foods and drinks (Table 2.1) interact with cariogenic bacteria within the dental plaque [12]. These bacteria, notably *Streptococcus mutans* and *Lactobacilli*, ferment the sugars, resulting in the production of organic acids as metabolic byproducts.

Table 2.1 Foods and drinks that contain non-milk extrinsic sugars (NMES). Reproduced from [12]

Foods and drinks that contain NMES
Candy and chocolate confectionery
Cakes, cookies and biscuits
Buns, pastries and fruit pies
Puddings, including spongy types
Dried fruits, including raisins
Sugar added to drinks or during cooking
Sugared breakfast cereals
Honey, jams and jellies
Ice cream
Fruits canned in syrup
Fresh fruit juices and smoothies
Sugared soft drinks and sodas
Sugared, milk-based drinks

The accumulation of these acids in the plaque biofilm leads to a significant reduction in the pH level of the oral environment, shifting it to a more acidic state. This drop in pH facilitates the demineralisation of the enamel. Continued exposure to acidic conditions results in the dissolution of calcium and phosphate from the enamel, eventually forming a cavity [13]. If these carious lesions are not adequately managed, the structural integrity of the enamel continues to degrade and the caries can extend deeper into the dentine and potentially to the pulp. This progression can result in more severe complications such as dental pain, infection and tooth loss.

2.4. Global epidemiology of dental caries

A systematic analysis of the Global Burden of Disease estimated that 2.3 billion people worldwide were affected by dental caries in permanent teeth, making it the most common health condition. Additionally, 530 million children globally suffered from caries in their deciduous teeth [14].

Inequalities in dental caries indicates significant disparities in oral health care across different income countries [15]. A comprehensive review showed that the prevalence of caries experience in primary teeth for 5-year-old children was higher in low-income (LIC), lower-middle-income (LMIC), and upper-middle-income countries (UMIC), at 64.4%, 83.4% and 76.4% respectively, compared to 49.0% in high-income countries (HIC). Conversely, the prevalence of caries experience in permanent teeth among 12-year-olds was highest in UMIC (69.4%), followed by HIC (46.6%), LIC (42.2%) and LMIC (41.9%). This indicates that dental caries remains a widespread issue across many countries irrespective of GDP [15].

2.5. Determinants of oral health

The oral health outcomes of children are influenced by a complex interaction of factors at different levels of child, family, community and environment, with an emphasis on the dynamic nature of these influences over time. The modified Fisher-Owens conceptual model of determinants on oral health shows that oral health is shaped by child-level factors, such as accepted health behaviours and practices; family-level factors, including socio-economic status and family function; and community-level factors comprising the dental care system characteristics (Figure 2.1) [16].

Finally, higher-level environmental factors encompass the broader social, economic and policy contexts that influence oral health outcomes over time. These include national health policies, economic conditions and societal attitudes towards oral health. Environmental determinants can either facilitate or hinder the effectiveness of community and family-level interventions [16]. For instance, public policies that support community water fluoridation can significantly reduce caries for children and adults across different communities [38].

Environment

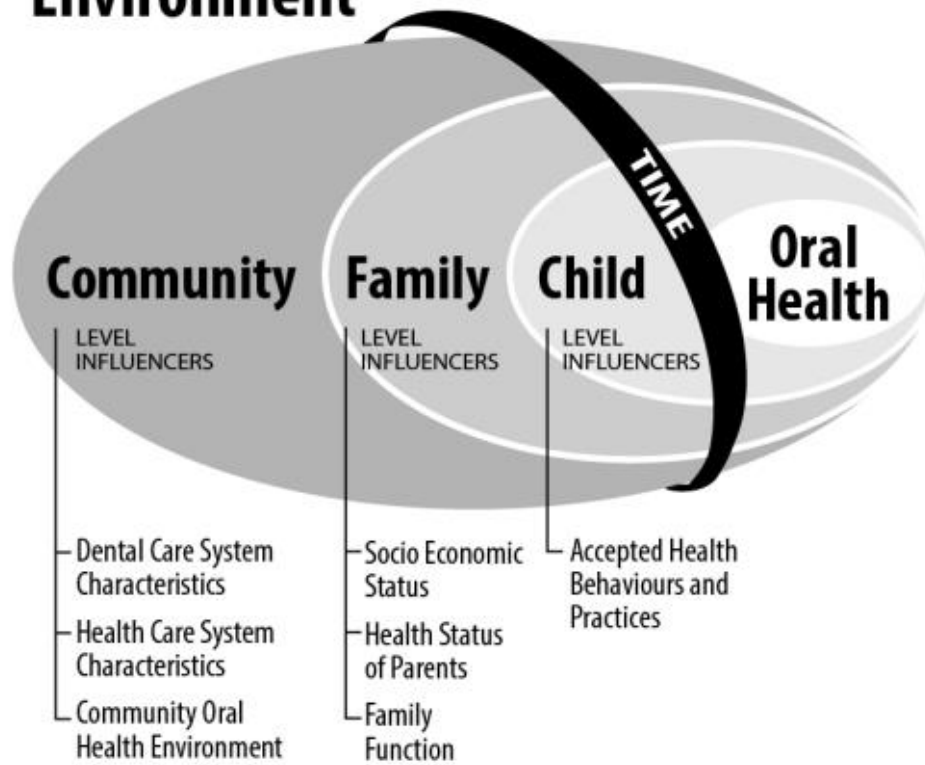


Figure 2.1 The modified Fisher-Owens conceptual model of determinants on oral health outcomes.
Taken from [16].

2.6. Social determinants of health

Social determinants of health, as defined by the World Health Organisation (WHO), are the conditions in which people are born, grow, live, work and age. These determinants play an important role in shaping health outcomes and contribute to health inequalities, including those observed in oral health. Factors such as income, education, employment, social support and access to healthcare services can significantly impact oral health by influencing health behaviours, access to preventive care and overall living conditions [17].

2.7. Impact of dental caries

Untreated childhood dental caries can result in oral symptoms such as dental pain, which can adversely affect children's quality of life, manifesting as challenges in eating and issues with sleep [18, 19]. A systematic review revealed that early childhood caries affects the oral health-related quality of life (OHRQoL) for preschoolers [20]. This review found that children experiencing early childhood caries were more likely to report adverse effects on OHRQoL compared to those without caries (OR: 1.99; 95% CI: 1.51 to 2.62). Additionally, a cross-sectional study reported that 49.0% of child participants in the United Kingdom (UK) experienced at least one oral impact on their daily activities. Among them, 28.7% faced eating difficulties, 18.5% had sleep issues, 14.9% avoided smiling due to dental pain and 12.5% avoided smiling because of their appearance [21].

Several studies indicated significant adverse effects on the families of affected children, with parents experiencing feelings of distress and guilt, taking time off work to care for their child and facing economic hardships [22-24]. Parents of children with severe dental caries were more likely to take time off work (OR: 2.75; 95% CI: 1.16 to 6.54), report increased child care needs (OR: 4.08; 95% CI: 2.15 to 7.75), feel guilty (OR: 6.32; 95% CI: 3.26 to 12.26), feel stressed (OR: 7.34; 95% CI: 4.15 to 12.99), have their routine activities disrupted (OR: 5.78; 95% CI: 2.71 to 12.34) and experience disrupted sleep (OR: 4.94; 95% CI: 2.78 to 8.76) [25].

If childhood caries is not addressed, it may lead to severe dental pain, ulceration, abscess and may necessitate hospitalisation [26]. In England, dental caries is the leading cause of hospital admissions among children aged 6 to 10 years [27]. From 2015 to 2021, there were 57,055 hospital admissions for dental caries among children aged 1-19 years, with an average admission rate of 465.1 per 100,000 children. Children aged 4 to 9 years constituted 68.9% (32,325 people) of these admissions during this period.

2.8. Overview of Brunei Darussalam

2.8.1. General information about Brunei Darussalam

Brunei Darussalam has been an independent nation since 1984 and is a Sultanate governed by the national philosophy of Malay Islamic Monarchy. It is situated in Southeast Asia, located in the northern shores of Borneo Island. The country covers an area of 5,765 square kilometres and is bordered by the Malaysian state of Sarawak. The capital of Brunei Darussalam is Bandar Seri Begawan. As of 2023, the population was estimated at 450,500 people, with 52.8% male and 47.2% female and an average life expectancy of 76.3 years [28]. 72.4% of the Brunei population resides in the Brunei-Muara district, the smallest of the four districts. The age range of 30 to 34 years old forms the largest demographic segment, comprising 9.21% of the entire population. The demographic composition primarily includes Malay (73.8%) and Chinese (9.6%) ethnicities, along with other ethnic groups (16.6%) (Figure 2.2).

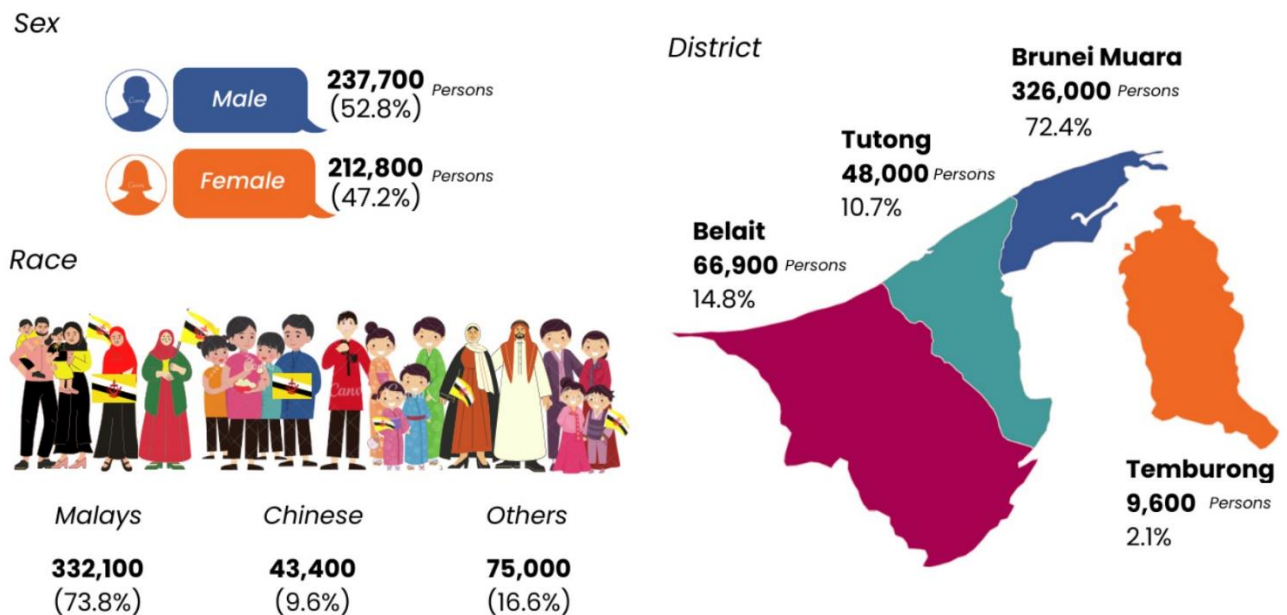


Figure 2.2 Population of Brunei Darussalam in 2023 by gender, districts and ethnicities.
Reproduced from [28].

The primary economic drivers in Brunei Darussalam are its oil and gas reserves. As reported by the Ministry of Finance and Economy, in 2013, the World Bank classifications rank Brunei Darussalam as having a gross national income per capita of USD 33,283.78, positioning it as the second wealthiest in the Southeast Asian region, following Singapore [29]. Strategies are being implemented to expand the country's economic foundation beyond its reliance on petroleum resources, aiming to transform it into a more diversified and newly industrialised country. This economic transition aims to reduce dependency on hydrocarbons and adopt sustainable growth through the development of alternative sectors.

2.8.2. Epidemiology of dental caries in Brunei Darussalam

The prevalence and severity of caries experience in the deciduous teeth of 5-year-old children in 2015 was 73.2% and dmft 5.1 respectively. Among children aged 5 to 6, females showed a slightly higher prevalence of caries in their primary teeth (74.5%; 95% CI: 69.1 to 79.9%) compared to males (73.7%; 95% CI: 68.5% to 79.0%) [30].

2.8.3. Overview of dental healthcare system

The dental healthcare system in Brunei Darussalam is part of the broader national health services provided by the government, heavily subsidised by the government to ensure widespread accessibility. In Brunei Darussalam, residents benefit from a well-established network of public health facilities that provide dental care free of charge for citizens and permanent residents [5].

Children and adults can access government-subsidised dental services year-round, ensuring continuous availability of routine check-ups, fissure sealants, fluoride applications, basic restorative treatments and more complex surgical procedures. Children are primarily treated by dental nurses within government health centres and school dental clinics, while adults receive care at government dental clinics. More complex procedures in children are referred to general dentists or dental paediatric specialists. Orthodontic treatments and cosmetic procedures are generally not covered under the subsidised scheme. For children, all basic dental services, including fillings, extractions and preventive care are free of charge. Adults receive similar benefits for essential dental treatments, although prosthodontics, such as dentures, may incur minimal fees. This approach ensures that comprehensive dental care remains accessible while prioritising preventive and essential treatments for younger populations [5].

In addition to public healthcare facilities, Brunei Darussalam also hosts several private dental clinics. These clinics often offer services that are also readily available in the public sector, including orthodontic treatments. While services in the private sector are more costly, they also typically feature shorter waiting times, appealing to those seeking immediate treatment options.

2.8.4. Current oral health prevention strategies in Brunei Darussalam

This section of the chapter explores into the current oral health prevention strategies in Brunei Darussalam, highlighting innovative programmes and guidelines developed to improve the dental health of its younger population.

2.8.4.1. “Toddler Smile” programme

The “Toddler Smile” programme, initiated in 2013, is a dental health programme specifically designed to address the oral health of young children from 6 months to 5 years of age in dental clinics [31]. In 2020, the programme was rebranded as “Senyum SiManja,” which translates to the “Toddler Smile” programme. It focuses on early preventive intervention and education to ensure that children develop healthy oral hygiene habits from a very young age, aiming to improve child health outcomes, recognising that good oral health is an integral component of overall health.

This programme involves several main interventions aimed at parents and caregivers, providing information on the importance of oral health, guidance on how to care for their children's teeth with fluoridated toothpaste, proper practices for breastfeeding and bottle-feeding. Additionally, the programme facilitates regular dental examination and fluoride varnish application for children from age 2. This ensures that oral health issues are identified and addressed early and familiarises children with the dental care environment, reducing anxiety and resistance to future visits.

2.8.4.2. Breastfeeding guidelines in clinical settings

The Ministry of Health in Brunei Darussalam engages in promoting, protecting and supporting breastfeeding as the preferred method of infant feeding. The guidelines set by the ministry in 2020 are based on a framework aligned with the WHO's recommendation of exclusive breastfeeding for the first 6 months of life, followed by continued breastfeeding with appropriate complementary foods for up to two years or beyond [32]. Expectant and new mothers receive information about the benefits of breastfeeding and how to overcome common challenges.

As an Islamic country, Brunei Darussalam holds a strong belief that even the Holy Quran mentions breastfeeding as a natural and blessed act, emphasising the importance of the mother's role in nurturing her child. The Quran does not specifically address the issue of dental caries in relation to breastfeeding, but it does highlight the overall benefits and the sacred nature of the bond between mother and child. In Surah Al-Baqarah, verse 233, Allah the Al-Mighty says, "*The mothers shall give suck to their offspring for two whole years, if the father desires to complete the term.*" [33]

2.8.4.3. Nutrition guidelines in childcare centres

The development of the 2019 "National Nutrition and Physical Activity Guidelines for Childcare Centres" in Brunei's early childhood settings involved collaboration between the Ministry of Health and the Ministry of Culture, Youth and Sports [34]. Childcare settings have been recognised as having a unique role in positively influencing children's well-being and future health before they enter the school environment. These guidelines serve as guiding principles for childcare centre providers to consider when establishing and maintaining a supportive nutrition and active, safe environment for infants and young children in their childcare settings. The focus is typically on decreasing the availability of high-calorie, low-nutrient items such as sugary drinks, snacks with high levels of salt and sugar and processed foods with artificial additives.

2.8.4.4. Fissure sealants programme in primary schools

Implementing fissure sealants in primary schools involves a collaborative effort between the Department of Dental Services and Ministry of Education. The programme started in 2022 and targeted children in Primary 1 and 2 of selected schools, likely those who have developed their permanent first molars, which usually occurs around the age of 6 [6]. The intervention process starts with oral health educational sessions where dental health professionals visit schools to educate children and teachers about the importance of oral hygiene and the specific benefits of fissure sealants via interactive presentations and demonstrations.

2.8.4.5. Sugar tax

The sugar tax represents an upstream approach, targeting the broader determinants of health to control sugar intake for both general health and oral health improvement. In 2017, Brunei Darussalam enacted changes to its customs and excise duties, levying a tax of € 2.75 for every 10 litres of beverages with high sugar content and a 3% duty on sugar and cocoa products [35]. The objective was to increase overall revenue and to reduce the demand for and consumption of SSBs. An initial evaluation indicated that 90% of consumers approved of the tax as an effective measure to combat non-communicable diseases (NCDs) and the price of taxed SSBs rose by 11% within 6 months of its implementation.

Specific details regarding the allocation of the revenue generated from this tax have not been publicly disclosed. The Ministry of Finance and Economy has not provided information on whether the funds are designated for specific health improvement programmes. Therefore, without official statements or reports, it is not possible to confirm how the revenue from the sugar tax is utilised.

Chapter 3

Literature review

3.1. Introduction

In this chapter, the evidence of inequalities in dental caries among children both inside and outside Brunei Darussalam will be discussed. Additionally, the associations of the prevalence and severity of dental caries among children with various oral health behaviours and socioeconomic status within and outside the country are explored through a comprehensive review of literature.

3.2. Search strategy

The literature review was conducted using a thorough search strategy. Electronic searches were performed on PubMed, Embase and Cochrane to identify relevant papers published from 2000 to April 2024. The search terms included a wide range of keywords with their synonyms, including preschool child, dental caries, health behaviour, toothbrushing, sugar intake, drink, food, dental attendance, health prevention, health promotion and dentistry (Appendix 1). In addition, the bibliographies of key papers were examined to uncover further relevant data. Relevant literature outside the defined search terms was also researched using Google Scholar. Additional resources, such as grey literature specific to Brunei Darussalam and reports on Brunei's dental health, were sourced from Google.com and acquired from the Ministry of Health in Brunei Darussalam.

3.3. The evidence of inequalities in childhood caries in countries other than Brunei Darussalam

Many studies suggested inequalities in dental caries among children within a country based on place of residents, ethnicities and socioeconomic status [36, 37]. An analysis of 40,360 children aged 3 to 5 years in China showed that children living in rural areas had a significantly higher caries experience (dmft $\pm$ Standard deviation, SD: 3.5 ± 0.03) than those living in urban areas (dmft: 3.14 ± 0.03) [37]. In a UK study that examined the socioeconomic gap and ethnic disadvantage in oral health among 8,541 children aged 5, those from White British or Irish backgrounds had a significantly lower predicted rate of carious teeth at 1.54 (95% CI: 1.30 to 1.77), compared to Indian children at (PR: 3.71; 95% CI: 1.08 to 6.34) and Pakistani children (PR: 2.85; 95% CI 1.85 to 3.85) [36].

3.4. The evidence of inequalities in childhood caries in Brunei Darussalam

Brunei Darussalam continues to face challenges with dental caries among its children, although the prevalence is decreasing. The 2015 CNOHS revealed that caries experience (i.e., dmft > 0) in the deciduous teeth of children aged 5 years decreased to 73.2% from 88.7% in 1999 [5, 30]. Moreover, the severity of caries experience in primary dentition has also shown improvement, with the mean dmft reducing from 7.1 in 1999 to 5.1 in 2015. While the reduction in the prevalence and severity of caries experience was encouraging, the figures still indicate that a substantial proportion of young children are affected by this oral health issue. Considering that the surveys were conducted on two different groups of children, results on decreasing prevalence should be reported with caution.

The 2015 CNOHS also revealed inequalities in the prevalence of caries experience among 5- to 6-year-old children from different ethnic backgrounds. Children of Brunei Malay ethnicity had a higher prevalence of caries experience in their primary dentition (76.7%; 95% CI: 72.0% to 81.4%) compared to those of Chinese ethnicity (59.1%; 95% CI: 47.7% to 70.4%) and other ethnicities (46.6%; 95% CI: 30.6% to 62.7%) [30].

Although the study did not explore the specific reasons for these differences, several factors, including cultural practices, could potentially explain the higher prevalence of caries experience among children of Brunei Malay ethnicity. Festive periods such as Eid celebration are characterised by an abundance of sugary foods and drinks, which may contribute to increased sugar consumption among children. Additionally, extended family dynamics, common in Brunei Malay household, may influence children's dietary habits. For example, grandparents who cared for the children while their parents were at work might provide sugary treats as a gesture of affection, inadvertently increasing children's exposure to cariogenic foods. It is important to note that these explanations are interpretations based on general knowledge of cultural and social dynamics in Brunei and were not directly explored in the study.

3.5. Role of child-level oral health behaviours on childhood caries outside Brunei Darussalam

At the individual level, the child's oral health behaviours may influence the oral health outcome. These include breastfeeding practices, daily oral hygiene routines and regularity of dental examinations. Effective dental care practices, along with reduced consumption of sugary foods and beverages, are essential in preventing dental caries. However, these behaviours are often shaped by factors beyond the child's immediate control [16].

3.5.1. Breastfeeding practices

Breastfeeding is widely recognised for its numerous health benefits, including nutritional advantages, immune support and promoting mother-child bonding [38]. However, the association between prolonged breastfeeding and the development of dental caries is multifaceted. Studies demonstrated that breastfeeding in the early months of life was generally protective against dental caries due to the immunological properties of breast milk and the fact that breast milk alone was less cariogenic than formula or other sugary liquids [39, 40].

A birth cohort study conducted in the Netherlands, which accounted for confounding and potential mediating variables, found that a longer duration of breastfeeding (more than 12 months) was significantly associated with caries experience (OR: 1.35; 95% CI: 1.04 to 1.74) in comparison to infants who were breastfed for only up to 6 months. Given these findings, the recommendation to breastfeed exclusively for around the first 6 months of a baby's life remains relevant [41]. This approach helps maintain the health benefits of breast milk while reducing the increased risk of dental caries associated with prolonged breastfeeding beyond this period [41].

3.5.2. Dietary habits

Studies showed that individuals who consumed sugars multiple times throughout the day were at a higher risk for developing caries compared to those with less frequent sugar intake [42, 43]. Frequent intake of sugary foods and beverages provides a constant supply of substrate for acid-producing bacteria, leading to prolonged periods of acid exposure and increased risk of enamel demineralisation. Therefore, reducing the frequency of sugar consumption is essential in preventing dental caries and promoting long-term oral health [44]. A systematic review on the effect of free sugars intake on dental caries risk also demonstrated a positive association between the quantity of free sugars consumed and the incidence of dental caries [45]. WHO recommended restricting sugars intake to less than 10% of total energy consumption, with further benefits observed when intake is reduced to below 5%, in order to support lower incidences of dental caries [46].

3.5.3. Daily oral hygiene routines

Daily toothbrushing habits are important in maintaining good oral health and preventing dental caries. A systematic review suggested that children who were infrequent brushers showed higher prevalence of caries experience (OR: 1.50; 95% CI: 1.34 to 1.69) than those who brushed at least twice daily [47]. This reduction was attributed to the combination of increased awareness about oral hygiene and the widespread use of fluoridated toothpaste. Another systematic review demonstrated that fluoride, present in concentrations ranging from 1,350 to 1,500 parts per million (ppm) in toothpaste significantly decreased the prevalence of caries experience [41, 48].

The benefits of fluoridated toothpaste can be undermined by rinsing with water after brushing. This habit can wash away the fluoride, reducing its protective effects and potentially increasing the risk of caries [48]. Those who rinsed with water after brushing experienced an increment of 6.84 caries on their permanent teeth, significantly higher than the 5.84 caries increment experienced by those who did not rinse post-brushing [49].

3.5.4. Patterns of dental visits

Early preventive dental visits can offer more effective and cost-efficient dental care compared to treatments provided in emergency dental care clinics [50, 51]. A study in China examined the impact of preventive dental visits at an early age on dental caries in children aged below 7 years. The findings suggested that there were associations between early preventive dental visits and a lower dmft score (OR: 0.69; 95% CI: 0.48 to 0.84) as well as a higher prevalence of children with caries-free experience (OR: 6.5; 95% CI: 3.93 to 10.58) [52]. Another study in Hong Kong revealed that children aged 3 to 5 years who had never visited a dentist had a higher prevalence of caries experience (OR: 2.14; 95% CI: 1.43 to 3.21) in comparison to children who had a dental visit [53].

3.6. Role of child-level oral health behaviours on childhood caries in Brunei Darussalam

There was no evidence directly assessing the associations of any oral health behaviours with the prevalence and severity of caries experience in Brunei Darussalam.

3.7. Role of family-level socioeconomic status on childhood caries outside Brunei Darussalam

Family-level influencers or factors, including socioeconomic status and parental health status, are significant determinants of a child's oral health. The socioeconomic status of the family can impact the availability of resources for dental care, including access to fluoride treatments and dental visits [16].

3.7.1. Parental education

The prevalence of dental caries in childhood was associated with socioeconomic status, with parental education, household income and the area of residence playing significant roles [54-56]. A recent scoping review indicated that children whose mothers had lower levels of education, as compared to those whose mothers had higher levels of education, were at a greater risk of consuming a cariogenic diet, practicing poor oral hygiene and under-utilising dental services for caries prevention [57].

3.7.2. Household income

Household income is an important factor; families with limited financial resources may struggle to afford essential dental care products, such as fluoride toothpaste and may be less likely to seek preventive and restorative dental services. A cross-sectional study assessed the association between caries experience and socioeconomic status among preschool children in China. Children from the lowest household income families had higher severity of caries experience (Incidence rate ratio, IRR: 1.16; 95% CI: 1.10 to 1.23) than those from the highest household income families [37].

3.7.3. Status of living area

Living in deprived areas further exacerbated the risk of childhood caries [58]. These areas often have limited access to dental care facilities, making it challenging for residents to maintain good oral health [59]. Children from lower socio-economic status, compared to their counterparts, faced greater barriers to better access to dental care, healthier diets and more supportive environments for maintaining oral hygiene, resulting in higher incidences of caries [59]. Significant gradients in the ORs by Index of Multiple Deprivation (IMD) quintiles were observed in the UK. The ORs for children from the least deprived areas (OR: 0.65; 95% CI: 0.46 to 0.93), the second least deprived areas (OR: 0.74; 95% CI: 0.50 to 1.08), middle areas (OR: 0.69; 95% CI: 0.50 to 0.96) and the second most deprived areas (OR 0.95; 95% CI: 0.64 to 1.43) were all lower compared to children from the most deprived areas [25].

3.8. Role of family-level socioeconomic status on childhood caries in Brunei Darussalam

3.8.1. Parental education

In Brunei Darussalam, there were gradients in the prevalence of caries experience among 5- to 6-year-olds based on parental education and household income. Children whose parents had only primary school education exhibited the highest prevalence of caries experience (78.4%; 95% CI: 73.0 to 83.7%), followed by those whose parents had secondary or vocational education (76.1%; 95% CI: 64.0 to 88.1%) and those with parents who attained tertiary education (66.1%; 95% CI: 58.0 to 74.2%).

3.8.2. Household income

Children from low-income households had the highest prevalence of caries experience (78.3%; 95% CI: 72.9 to 82.8%). This was higher compared to children from medium-income households (69.5%; 95% CI: 57.9 to 81.0%) and high-income families (68.7%; 95% CI: 60.5 to 77.0%) [30].

3.8.3. Status of living area

There was no evidence assessing the association of living area status with the prevalence and severity of caries experience in Brunei Darussalam.

3.9. Overview of current evidence, limitations and gaps in research literature

There was limited evidence of inequalities in dental caries in deciduous dentition among children in Brunei Darussalam. Moreover, there is no evidence assessing the associations of early-life oral health behaviours and current oral health behaviours with the prevalence and severity of caries experience among children in Brunei Darussalam. This thesis is significant as it addresses an important gap in the existing literature on dental caries in deciduous dentition among children in Brunei Darussalam, particularly focusing on the influence of early-life and current oral health behaviours. By examining these factors, the research can provide an understanding into the determinants of oral health inequalities and inform the development of evidence-based public health interventions to reduce the prevalence and severity of caries experience in this child population.

Chapter 4

Aims and objectives

4.1. Overall aims

The overall primary aims of this thesis were:

- to examine the prevalence and severity of caries experience in 5-year-old children participating in the 2015 CNOHS and current oral epidemiological surveys
- to assess the associations of early-life and current oral health behaviours with dental caries experience among children aged 5 years during both surveys

Meanwhile, the overall secondary aims were:

- to assess the associations of sociodemographic characteristics with dental caries experience in 5-year-old children during both surveys
- to provide recommendations for the oral health prevention strategies that will be implemented the children population in Brunei Darussalam

4.2. Overall objectives

The overall objectives of this thesis were:

- to identify oral health behaviours influencing the caries experience of 5-year-old children
- to explore parents' understanding of the associations between children's oral health behaviours and their oral health

4.3. Research questions

The overall research questions of this thesis are:

- What are the prevalence and severity of caries experience among 5-year-old children in Brunei Darussalam in 2015 and 2023?
- Which oral health behaviours are associated with caries experience among 5-year-old children in 2015 and 2023?
- Which sociodemographic characteristics are associated with caries experience among 5-year-old children in 2015 and 2023?
- What recommendations for children's oral health prevention strategies can be provided to guide the Department of Dental Services?

Chapter 5

**Study 1: Assessment of the associations of
early-life behaviours and
current oral health behaviours and
caries among children from the
National Oral Health Survey (2015)
- A quantitative study**

5.1. Introduction

In the medical research field, it is common for collected data from health surveys to remain untouched and unanalysed or not fully utilised due to various constraints, such as limited resources, lack of expertise or other priorities [60]. This situation also applies to the Brunei national oral epidemiological survey data collected in 2015, where the raw dataset was not fully leveraged to maximise its potential. Even though this data is almost 10 years old, it remains valuable. The findings can inform data collection methodologies and complement the results of Study 2 and 3 of this thesis, providing a more better understanding of the dental health landscape over time.

By analysing these data, the principal investigator of this thesis had gained a deeper understanding of the dental health status among young children in Brunei Darussalam in 2015, identified key factors contributing to dental caries and formulated evidence-based recommendations to improve oral health prevention strategies and policies. Additionally, through the descriptive analysis of these data, the principal investigator was able to identify areas for improvement in data collection methods, including the design and wording of questionnaire items. Some missing data could be attributed to the selection and length of questions, as noted by the principal investigator in his master's thesis [7]. This analysis had provided a valuable understanding into optimising future surveys to ensure more thorough and accurate data collection.

Furthermore, these findings had not only enhanced the understanding of past dental health trends but had also informed Study 2, which aimed to assess the current state of oral health among children. By comparing past and present data, the author could identify trends, improvements, or emerging issues in dental health over the past decade. Study 3 also benefited from the recommendations derived from Study 1 analysis, providing a historical context that had guided the principal investigator in building questions for the semi-structured interviews with parents.

This first study of the thesis involved a secondary analysis of cross-sectional data from the 2015 CNOHS. This chapter begins by introducing the second CNOHS with its components, which provides the data for the secondary analysis. It then outlines the statistical analysis plan and presents the study results. These results explore variations in the prevalence and severity of caries experience across different sociodemographic characteristics. Moreover, the chapter assesses the associations between oral health behaviours and caries experience in 5-year-old children.

5.1.1. Child National Oral Health Survey in Brunei Darussalam

The Brunei Oral Health Agenda (2008 to 2012) reported the significance of oral health to general health and quality of life, emphasising the need to reduce the prevalence of caries experience and improve oral health among the Brunei population. This agenda also recommended conducting an Oral Health Survey every 10 years to provide essential, accurate and reliable data on the oral health status of children and adults. [31].

In response to these recommendations, the Ministry of Health, Brunei Darussalam, in partnership with the Australian Research Centre for Population Oral Health (ARCPHO) at the University of Adelaide, undertook a comprehensive national oral health study in two phases. The first phase, conducted in 2015, focused on children, while the second phase, from 2016 to 2017, targeted adults. The 2015 CNOHS aimed to provide the latest and accurate data on the dental health of school-aged children aged 5 to 15 years across Brunei Darussalam. This survey was the second in a sequence of cross-sectional dental health studies in the country [30].

5.1.1.1. Survey sampling size

The sample was determined by maximising the necessary sample size for various oral conditions, considering each age group individually. The following factors were taken into consideration: a prevalence range from 10% to 50%, a confidence level of 95%, a sampling margin of error of 4.0 percentage points, a design effect of 1.3 (resulting from cluster sampling) and an extra 15% to account for potential non-responses. The calculated minimum sample size was 3,485 schoolchildren.

5.1.1.2. Survey sampling

The initial stage of sampling involved selecting schools. A sampling frame was constructed, consisting of all government and non-government schools, with separate frames for primary and secondary schools (combined schools were included in the secondary schools' frames). Schools were excluded if they were in extremely remote locations (inaccessible by land), had very small enrollments (fewer than 50 students, with 4 primary schools falling into this category), or were special schools.

Schools were organised by district, type and enrollment size. They were then systematically selected using probability proportional to size (based on enrollment numbers). When schools declined to participate, they were replaced with an adjacent school from the sampling frame. This process resulted in the selection of 65 schools.

The second stage involved the selection of children. Lists of children from the selected schools were obtained and children were chosen based on their respective school years, for instance, those aged 5 and 6 years were chosen from the kindergarten and Primary 1. A list of children in each school was compiled, including their birth dates and ages. A systematic sampling method was employed to select the children. Each child was assigned a number and for each age group, a specified number of children was randomly selected (Table 5.1) using an online random number generator. Losses were not replaced to prevent significant selection bias.

Table 5.1 Selection of child participants by age groups and school year

Age group (years)	School year	No. of children required (per school)
5 to 6	Kindergarten and Primary 1	22
7 to 8	Primary 2 and 3	12
9 to 10	Primary 4 and 5	12
11 to 12	Primary 6 and Secondary 1	23
13 to 15	Secondary 2, 3 and 4	27

5.1.1.3. Inclusion criteria

The child was included if:

- the child was 5 years old and had not yet reached his or her sixth birthday on the day of the dental examination
- the parent or guardian consented for the child's participation in the survey

5.1.1.4. Exclusion criteria

The child was excluded if:

- the child was 6 years old during the day of the dental examination
- there was no consent given from the parent or guardian
- the child suddenly refused the dental examination during the examination day

5.1.1.5. Ethical consideration

The ethical clearance for conducting the 2015 CNOHS was obtained from the Research Ethics Committee of the University of Adelaide (Project number: H-2015-168) and the Ministry of Health of Brunei Darussalam in 2014.

5.1.1.6. Survey data collection

The survey was divided into two main components. The first part involved data collection through parental self-complete questionnaires. Parents or guardians were given participant information leaflets (PILs), consent forms and questionnaires (Appendix 2) via the schools and these were returned to the schools after completion. The questionnaires were designed to assess parental socioeconomic information, patterns of service use, perceptions of oral health, oral health knowledge, attitudes and behaviours of both parents and children.

Prior to the main study, the questionnaire was pilot-tested with five parents of 5-year-old schoolchildren from diverse socioeconomic backgrounds to evaluate its comprehensibility, relevance and practicality. Feedback from these pilot questionnaires highlighted areas that required improvement, such as rewording certain questions to reduce ambiguity, simplifying terminology to improve understanding and refining the overall structure for a smoother completion process. These aspects informed minor revisions aimed at improving the clarity and usability of the questionnaire, ensuring it was accessible and easy to interpret for parents across varying levels of literacy and socioeconomic contexts.

The second part consisted of clinical examinations for the consenting children. Detailed oral examinations were conducted by dental practitioners who had undergone training in survey procedures. These examinations were carried out onsite in the participating schools using portable dental equipment. The examiners followed a standardised protocol provided by ARCPOH, which based the dental examination on the WHO's fifth edition of the "Oral health surveys: basic methods" guidelines [61].

The extent and severity of oral diseases and conditions in children aged 5 to 15 years were investigated, including dental caries at the tooth surface level (dmfs or DMFS) and periodontal disease (Bleeding Index and Simplified Oral Hygiene Index). The examination teams underwent a three-day training programme conducted by oral epidemiologists from ARCPOH and they received manuals outlining the protocol [30]. Data recording was done directly onto a laptop computer using a Microsoft Access programme specifically designed for this purpose.

A total of 79 replicate pairs of examinations were conducted to assess the reliability of the 6 examiners (Table 5.2). The number of missing teeth, number of decayed surfaces and number of filled surfaces were analysed. The overall reliability scores among examiners for these indices were excellent.

Table 5.2 *Reliability scores of dental examiners.*

Dental index	Overall reliability score
No. of missing teeth per child	0.98
No. of decayed surfaces per child	0.95
No. of filled surfaces per child	0.99

5.2. Study aims

The primary aims of this first study were:

- to examine the prevalence and severity of caries experience in 5-year-old children participating in the 2015 CNOHS
- to assess if there are any significant associations between caries experience in 5-year-old children and their oral health behaviours when they were 2 to 3 years old
- to assess if there are any significant associations between caries experience in 5-year-old children and their current oral health behaviours

Meanwhile, the secondary aim of the study was:

- to assess if there are any significant associations between caries experience in 5-year-old children and their sociodemographic characteristics

5.3. Methods

5.3.1. Study sample

For this study, a subsample of the 2015 CNOHS dataset, specifically 5-year-old children, was used for the secondary analysis. The original data were obtained from the Department of Dental Services of Brunei Darussalam, with approval granted by both the department and the ARCPOH at the University of Adelaide. No ethical approval was required for this secondary analysis of a previous survey.

5.3.2. Variables

5.3.2.1. Oral health outcomes

In this secondary analysis study, the main outcomes (Table 5.3) were:

- the prevalence of 5-year-old children experiencing caries in the deciduous teeth, indicated by the proportion of children with $dmft > 0$
- the severity of caries experience in this age group, indicated by the mean $dmft$ score across all children

Table 5.3 Outcome variables and their categories for Study 1

Variable	Source	Categorisation for analysis	Type (No. of categories)
Prevalence of children with caries experience (prevalence of $dmft > 0$)	Created a new variable by categorising based on " $dmft > 0$ "	" $dmft = 0$ " " $dmft > 0$ "	Binary (2)
Severity of caries experience (mean $dmft$)	Original data from the 2015 CNOHS dataset	0 and above	Continuous

5.3.2.2. Exposures

5.3.2.2.1. Early-life behaviours

These early-life behaviours had the significance to influence the prevalence and severity of caries experience among children in Brunei Darussalam (Table 5.4):

Table 5.4 Early-life behavioural variables and their categories for Study 1

Variable	Reponses in the questionnaire	Categorisation for analysis	Type (No. of categories)
Age at which children started toothbrushing	Write the year and month in the box provided	6 months and below	Ordinal (4)
		6 to 12 months	
		12 to 24 months	
		24 months and above	
Frequency of daily toothbrushing at ages 2-3	- Less than once - Once	Less than twice	Binary (2)
	- Twice - More than twice	Twice and more	
Toothbrushing supervision at ages 2-3	Child only	No supervision	Binary (2)
	- Adult only - Adult and child together	Parental supervision	
Age at which they stopped breastfeeding	Never had breast milk		
	Less than 12 months old	12 months and below	Ordinal (3)
	12 months to less than 2 years old	Between 12 and 24 months	
	2 to less than 3 years old 3 to less than 4 years old 4 to less than 5 years old	24 months or more	
Age of first dental visit	Under 1 year old	Below 12 months	Ordinal (3)
	1 year old 2 years old 3 years old 4 years old 5 years old 6 years old 7 years old and above	12 months and above	
	Never visit	Never visit	

5.3.2.2.2. Current oral health behaviours

The following current oral health behaviours were also utilised to assess their possible influences on the prevalence and severity of caries experience among children (Table 5.5):

Table 5.5 Current oral health behavioural variables and their categories for Study 1

Variable	Responses in the questionnaire	Categorisation for analysis	Type (No. of categories)
Frequency of toothbrushing per day at age 5	- Less than once a day - Once a day	Less than twice	Binary (2)
	- Twice a day - More than twice a day	Twice and more	
Type of toothpaste used	'Write a brand name of toothpaste used'	Fluoridated adult	Nominal (3)
		Fluoridated child	
		Non-fluoridated	
Amount of toothpaste used	Full length of brush head	Full length of brush head	Nominal (3)
	Pea size	Peas size	
	Smear layer	Smear layer	
Habit after brushing	Just swallow	Swallow or rinse and spit	Binary (2)
	Rinse and swallow		
	Rinse and spit		
	Just spit	Just spit	
Frequency of sugary food intake per day	- Rarely or never - None per day - Once a day	Once or less	Ordinal (3)
	- Two times a day - Three times a day	Two or three times	
	Four or more times a day	Four times or more	
Frequency of SSBs intake per day	- Rarely or never - None per day - Once a day	Once or less	Ordinal (3)
	- Two times a day - Three times a day	Two or three times	
	Four or more times a day	Four times or more	
Dental attendance in the last two years	- Twice a year - Once a year - Once every 2 years - No regular pattern	Had visited	Binary (2)
	No visit in the past 2 years	Never visit	

5.3.2.2.3. Sociodemographic variables

The following sociodemographic variables were used for analysing the prevalence and severity of caries experience among these children (Table 5.6):

Table 5.6 Sociodemographic variables and their categories for Study 1

Variable	Reponses in the questionnaire	Categories for analysis	Type (No. of categories)
Sex	• Male	Male	Binary (2)
	• Female	Female	
Child ethnicity	• Brunei Malay (Brunei, Tutong, Belait, Temburong) • Other Brunei Malay (Dusun, Bisaya, Murut, Kedayan)	Brunei Malay	Nominal (3)
	• Chinese	Chinese	
	• Other Indigenous (Iban, Punan, Kelabit) • Other	Other	
School type	• Government	Government	Binary (2)
	• Private	Private	
Highest level of education of one of the parents	• No formal education • Primary 1-6 • Form 1-5	Secondary or below	Ordinal (3)
	• Technical or Vocational/ National Diploma • A level/ Higher National Diploma (HND)	Vocational, A level and HND	
	• Bachelor’s Degree • Master’s Degree/ Postgraduate Certificate/ • Postgraduate Diploma • PhD or higher	Bachelor’s degree or above	
Household income per month	• Less than B\$1,000 • B\$1,000 – 1,999	Less than B\$2,000	Ordinal (3)
	• B\$2,000 – 2,999	B\$2,000 – 2,999	
	• B\$3,000 – 3,999 • B4,000 and above	B3,000 and above	

5.3.3. Statistical analysis

5.3.3.1. Preparation of data

The outcome variables were as follows: the 'prevalence of dmft > 0', which was binary and the mean dmft, expressed as counts starting from '0'. The exposures included the age at which children started toothbrushing, the age at which they stopped breastfeeding, the age of their first dental visit and the frequency of daily sugary food intake, all of which were ordinal categorical variables. Meanwhile, the variable 'type of toothpaste used' was a nominal variable with three categories. Additionally, the frequency of daily SSBs, the frequency of daily toothbrushing at ages 2 to 3 and 5, toothbrushing supervision at age 2 to 3 and the pattern of dental visits in the last two years were binary variables.

The sociodemographic variables included: sex and school type, both of which were binary. Meanwhile, child ethnicity was a nominal variable. Finally, the highest level of education of one of the parents and household income per month were ordinal.

5.3.3.2. Descriptive analysis

The associations of the prevalence of caries experience (i.e. dmft > 0) with various demographic characteristics, early-life and current oral health behaviours were analysed using the chi-square test, which yielded:

- percentages that indicate the distribution of caries across groups or categories
- 95% CIs that provide a range of estimated values within which the true measure may lie
- effect sizes that measure the strength of these associations
- p-values that assess the statistical significance of the findings

Results with p-values less than 0.05 ($p < 0.05$) were considered statistically significant, indicating that the observed associations were unlikely to have occurred by chance and suggesting a meaningful association between the analysed variables and the prevalence of caries experience. This threshold of significance emphasises the strength of the findings, providing confidence in the reliability of the detected associations.

Meanwhile, the associations of the severity of caries experience with various demographic characteristics, early-life and current oral health behaviours were analysed using the Mann-Whitney test for two-group comparisons or the Kruskal-Wallis test for multi-group analyses which produced:

- the mean dmft
- first quartile (Q1), median and third quartile (Q3) values
- effect sizes
- p-values

All statistical analyses were performed using the Stata version 18 and SPSS version 28 programmes.

5.3.3.3. Regression analysis

Regression modelling was used to assess the associations between early-life behaviours, current oral health behaviours and caries experience in children aged 5 years. This study utilised both binary and count outcomes. The analysis was based on complete case data, which means that only participants with complete information on all relevant variables were included in the regression models. This approach ensures that the data used in the analysis are consistent and reliable, minimising significant biases that could arise from missing data.

5.3.3.3.1. *Logistic regression models for binary outcomes*

The associations between each oral health behaviour and the ‘prevalence of dmft > 0’ was analysed using logistic regression since the ‘prevalence of dmft > 0’ outcome was binary. The logistic regression analysis yielded ORs, 95% CIs and p-values. For each behaviour, the following statistical models were run:

- Model 1: The association between each behaviour and ‘prevalence of dmft > 0’
- Model 2: Model 1 and adjusted for sex and ethnicity
- Model 3: Model 2 and additionally adjusted for school type
- Model 4a: Model 3 and additionally adjusted for parental education
- Model 4b: Model 3 and additionally adjusted for household income
- Model 5: Model 3 and additionally adjusted for parental education and household income

5.3.3.3.2. *Zero-inflated negative binomial regression models for count outcomes*

The choice to use the ZINB model was validated over alternatives, including the Poisson, Negative Binomial and Zero-inflated Poisson models after statistical testing using a supplementary command known as the “countfit” test, accessed through the “spost13_ado” file [43]. The outcomes of the “countfit” tests are displayed in Figure 5.1 and Table 5.7.

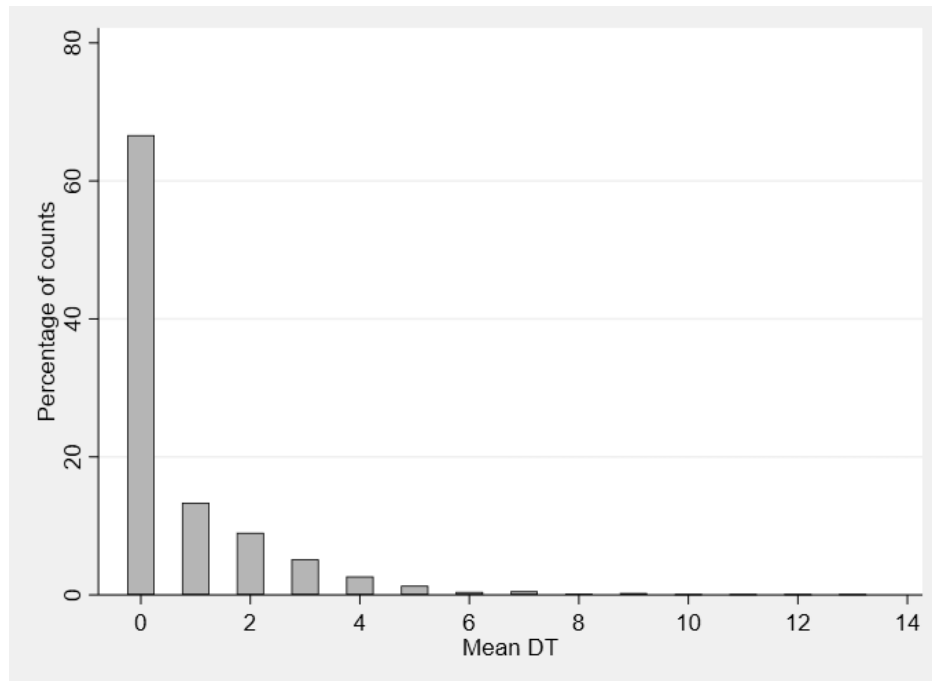


Figure 5.1 Mean severity of caries experience in 5-year-old children in Study 1

Table 5.7 The “countfit” test outcomes supported the selection of the ZINB regression model to assess how variations in early-life and current oral health behaviours affect the severity of caries experience in Study 1

Model comparison	Metric	Value	Difference	Preference	Evidence
PRM					
vs NBRM	BIC	6771.319	2475.781	NBRM > PRM	Very strong
	AIC	6713.096	2481.074	NBRM > PRM	
	LRX2	2483.074	Prob = 0.000	NBRM > PRM	
vs ZIP	BIC	7372.948	1874.152	ZIP > PRM	Very strong
	AIC	7267.088	1927.082	ZIP > PRM	
	Vuong	.	Prob = .	ZIP > PRM	
vs ZINB	BIC	6704.507	2542.593	ZINB > PRM	Very strong
	AIC	6593.353	2600.816	ZINB > PRM	
NBRM					
vs ZIP	BIC	7372.948	-601.629	NBRM > ZIP	Very strong
	AIC	7267.088	-553.992	NBRM > ZIP	
vs ZINB	BIC	6704.507	66.812	ZINB > NBRM	Very strong
	AIC	6593.353	119.742	ZINB > NBRM	
	Vuong	.	Prob = .	ZINB > PRM	
ZIP					
vs ZINB	BIC	6704.57	668.441	ZINB > ZIP	Very strong
	AIC	6593.353	673.734	ZINB > ZIP	
	LRX2	675.734	Prob = 0.000	ZINB > ZIP	

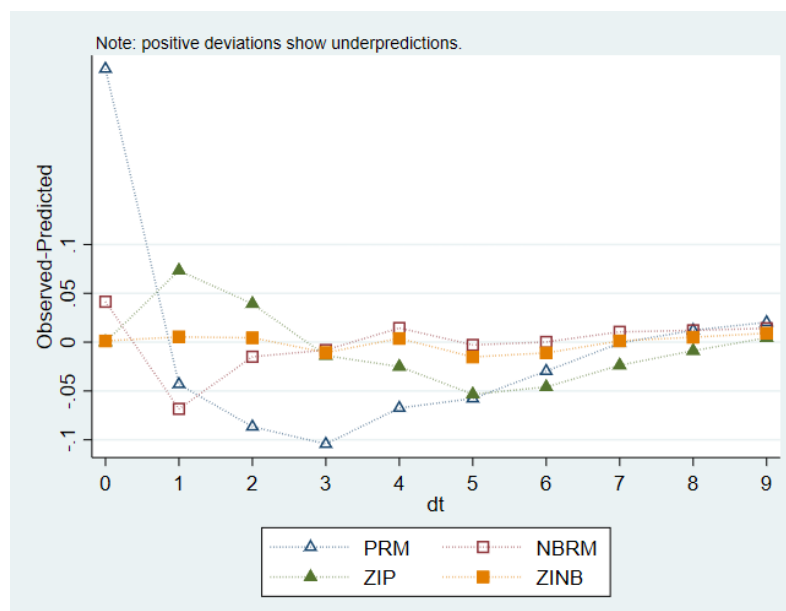


Figure 5.2 The STATA output indicates that ZINB was appropriate for analysing the associations between early-life behaviours and the severity of caries experience in Study 1

Therefore, ZINB regression was used to assess the associations between each oral health behaviour and the 'mean dmft' because the outcomes were count data from '0', which were not normally distributed and exhibited an overabundance of zeros (Figure 5.2). For each behaviour, the following statistical models were run:

- Model 1: The association between each behaviour and 'severity of caries experience'
- Model 2: Model 1 and adjusted for sex and ethnicity
- Model 3: Model 2 and additionally adjusted for school type
- Model 4a: Model 3 and additionally adjusted for parental education
- Model 4b: Model 3 and additionally adjusted for household income
- Model 5: Model 3 and additionally adjusted for parental education and household income

ZINB regression is composed of two parts, based on the theory that the excessive zero counts and the number of events is generated by two distinct processes [62]. The Negative Binomial part (count model) of the analysis focused on predicting those individuals with one or more instances of visible caries and this part yielded ORs, 95% CIs and p-values. On the other hand, the Zero-Inflated part (caries-free model) of the ZINB model functioned as a logit model that models the probability of having zero counts of visible caries among the participants and this section likewise yielded ORs, 95% CIs and p-values.

The analysis of the associations between all combined early-life behaviours (or all combined current oral health behaviours) and the 'prevalence of dmft' and 'mean dmft' was not performed due to a high proportion of missing data in the variables 'age of stopping breastfeeding (12.7%) and 'frequency of daily consumption of SSBs' (33.5%). Including these variables with the other oral health behavioural variables in the fully adjusted model of the main analysis would have resulted in a significantly reduced sample size, thereby compromising the main analysis.

5.3.3.3.3. *Assessing model significance for real-world conclusions*

When determining which models can be used to draw conclusions for real-world applications, it is important to understand the role of each model and the significance of their results. Model 1 (unadjusted) provides the raw association between an exposure (such as, stopping breastfeeding) and an outcome (such as, prevalence of having dmft > 0). However, this model does not account for confounding variables, which can distort the observed association. While Model 1 can provide initial understanding of the association, it cannot be relied upon for real-world conclusions due to its lack of adjustment for important factors.

Models 2 to 4 (partially adjusted) progressively account for a subset of confounding variables, including sex, ethnicity, school type and either parental education or household income. These models are more reliable than Model 1 because they reduce some of the bias caused by confounding. However, if Models 2 to 4 are significant but Model 5 (fully adjusted) is not, caution is required when interpreting these results. The disappearance of significance in Model 5 suggests that the associations observed in Models 2 to 4 may have been influenced by residual confounding factors that are only accounted for in the fully adjusted model. As such, while Models 2 to 4 can provide valuable understandings, they cannot be used as a basis for drawing definitive conclusions when Model 5 fails to show significance [63].

Model 5 (fully adjusted) is the most robust and reliable model, as it accounts for all relevant confounding variables. By adjusting for a thorough range of real-world complexities, it provides the most precise and accurate estimate of the true association between the exposure and the outcome. The significance of Model 5 indicates that, after controlling for all confounders, a meaningful and valid association exists, making it the ideal model to guide conclusions for real-world applications [63].

5.4. Results

5.4.1. Response to the survey

A total of 436 questionnaires were distributed to the parents of 5-year-old children, with 85.2% returned and completed. Among those who submitted completed questionnaires, only 83.5% of the children underwent a dental examination. After excluding child participants whose parental questionnaires and dental examination data did not match, 355 children, representing a response rate of 81.4%, were included in the analysis for this first study.

5.4.2. Results from parental questionnaire

5.4.2.1. Sociodemographic characteristics

Table 5.8 demonstrates the sociodemographic characteristics of a sample of children. Out of 355 children, 49.3% were male and 50.7% were female. Among 318 children, 80.8% were Brunei Malay, 11.6% were Chinese and 7.6% belonged to other ethnicities. The majority, 73.0%, resided in Brunei Muara, while smaller percentages lived in the other districts. 47.3% attended government schools and 52.7% attended private schools. In 47.7% of the families, the highest education level of one parent was secondary school or below, while 26.8% had completed vocational education or its equivalent and 25.5% had a bachelor's degree or higher. Household income data revealed that 51.1% earned less than B\$2,000 per month, 16.4% earned between B\$2,000 and B\$2,999 and 32.5% earned B\$3,000 or more.

Table 5.8 Sociodemographic characteristics of the samples (n = 355)

Variable	No. of children (Missing data)	% Valid (% Missing)
Sex (n = 355)		
Male	175	49.3
Female	180	50.7
Child ethnicity (n = 318)		
Brunei Malay	257	80.8
Chinese	37	11.6
Other	24	7.6
	(37)	(10.4)
District (n = 335)		
Brunei Muara	259	73.0
Tutong	20	5.6
Belait	66	18.6
Temburong	10	2.8
School type (n = 345)		
Government	168	47.3
Private	187	52.7
Highest education of one parent (n = 325)		
Secondary or below	155	47.7
Vocational, A level and HND	87	26.8
Bachelor's degree or above	83	25.5
	(30)	(8.5)
Household income* (n = 286)		
Low income	146	51.1
Medium income	47	16.4
High income	93	32.5
	(69)	(19.4)

*Household income received per month – Low: less than B\$2,000 (or equivalent to less than € 1,414), medium: B\$2,000 to 2,999 (or €1,414 to €2120), high: B\$3,000 and above (or €2,121 and above).

5.4.2.2. Child's early-life behaviours

Out of the 314 children, 43.3% started brushing their teeth by 6 months, 34.1% by 12 months, 14.6% by 24 months and 8.0% started at 24 months or later (Table 5.9). At age 2 to 3, 63.2% of the children brushed their teeth twice or more per day, with 88% of the 325 children having adult supervision in brushing. For breastfeeding, 53.2% of the 310 children stopped by 12 months, 17.1% after more than 12 months and 29.7% after 24 months or more. Regarding dental visits, 64.5% of the children had their first visit after 12 months, 7.3% before 12 months and 28.1% never visited a dentist.

Table 5.9. *Children's early-life behaviours concerning dental hygiene and practices*

Variable	No. of children (Missing data)	% Valid (% Missing)
Age start brushing (n = 314)		
6 months and below	136	43.3
6 to 12 months	107	34.1
12 to 24 months	46	14.6
24 months and above	25	8.0
	41	(11.6)
Frequency of brushing per day at age 2-3 (n = 326)		
Less than twice	120	36.8
Twice and more	206	63.2
	(29)	(8.2)
Toothbrushing supervision at age 2-3 (n = 325)		
No supervision	39	12.0
Parental supervision	286	88.0
	(30)	(8.5)
Age of stopping breastfeeding (n = 310)		
12 months and below	165	53.2
More than 12 months	53	17.1
24 months or more	92	29.7
	45	(12.7)
Age of first dental visit (n = 327)		
Below 12 months	24	7.3
12 months and above	211	64.5
Never visit	92	28.1
	(28)	(7.9)

5.4.2.3. Child's current oral health behaviours

Table 5.10 summarises the current oral health behaviours among children with 84.5% brushed their teeth twice or more daily. Among 331 children, 80.1% used fluoridated adult toothpaste and 58.8% of 335 children used a pea-sized amount. After brushing, 90.0% of 338 children swallowed, rinsed and spat. Regarding sugary food intake, 67% of 315 children consumed it once or less per day, while 46.2% of 236 children drank sugary beverages four times or more daily. In the past two years, 57.5% of 355 children did not visit a dentist.

Table 5.10 Current oral life behaviours among study children

Variable	No. of children (Missing data)	% Valid (% Missing)
Frequency of brushing per day at present (n = 330)		
Less than twice	51	15.5
Twice and more	279 (51)	84.5 (7.0)
Type of toothpaste used (n = 331)		
Fluoridated adult toothpaste	265	80.1
Fluoridated child toothpaste	56	16.9
Non-fluoridated toothpaste	10 (24)	3.0 (6.8)
Amount of toothpaste used (n = 335)		
Full length of brush head	99	29.6
Pea size	197	58.8
Smear layer	39	11.6
Habit after brushing (n = 338)		
Swallow, rinse and spit	297	90.0
Just spit	33 (25)	10.0 (7.0)
Frequency of sugary food intake per day (n = 315)		
One time or less	211	67.0
Two or three times	70	22.2
Four times or more	34 (40)	10.8 (11.3)
Frequency of sugary drink intake per day (n = 236)		
One time or less	53	22.5
Two or three times	74	31.3
Four times or more	109 (119)	46.2 (33.5)
Dental attendance in the last two years (n = 355)		
Had visited	151	42.5
No visit	204	57.5

5.4.3. Outcome data

5.4.3.1. Prevalence of children with caries experience by sociodemographic characteristics

Table 6.11 shows the prevalence of caries experience among children across different sociodemographic characteristics. 73.2% (95% CI: 68.6 to 77.8%) of all children in the survey had experienced caries. The prevalence of caries experience was higher in males (76.0%; 95% CI: 70.8 to 81.2%) compared to females, though this **difference was not statistically significant** ($p = 0.247$). Brunei Malay children had the highest prevalence of caries experience (75.1%; 95% CI: 69.5 to 80.7%), while Chinese children had the lowest prevalence, also with a **non-significant difference** ($p = 0.063$). By district, Belait recorded the highest prevalence (74.2%; 95% CI: 59.2 to 70.8%) and Tutong the lowest, with **no significant difference** ($p = 0.846$). Children attending government schools had a higher prevalence of caries experience (81.0%; 95% CI: 76.2 to 85.8%) compared to those from private schools, with a **significant difference** ($p < 0.002$). Meanwhile, children with secondary or lower levels of parental education (77.0%; 95% CI: 71.7 to 82.3%) and those from low-income families (78.1%; 95% CI: 72.5 to 83.7%) showed the highest prevalence of caries experience in their respective categories, though the difference was **not significant** ($p = 0.235$ and 0.359 , respectively).

Table 5.11 Prevalence of children with dmft > 0 by sociodemographic characteristics

Variable	n	Prevalence (%) of dmft > 0 (95% C.I.)	Chi-sq	p-value
All children	355	73.2 (68.6, 77.8)	-	-
Sex				
Male	133	76.0 (70.8, 81.2)		
Female	127	70.6 (65.1, 76.1)	1.342	0.247
Child ethnicity				
Brunei Malay	193	75.1 (69.5, 80.7)		
Chinese	21	56.8 (50.4, 63.2)		
Other	17	70.8 (64.9, 76.7)	5.517	0.063
District				
Brunei Muara	191	73.8 (68.5, 79.1)		
Tutong	13	65.0 (59.2, 70.8)		
Belait	49	74.2 (68.9, 79.5)		
Temburong	7	70.0 (64.4, 75.6)	0.814	0.846
School type				
Government	136	81.0 (76.2, 85.8)		
Private	124	66.3 (60.6, 72.0)	9.681	0.002
Highest education of one parent				
Secondary or below	116	74.8 (69.3, 80.3)		
Vocational, A level and HND	67	77.0 (71.7, 82.3)		
Bachelor's degree or above	55	66.3 (60.3, 72.3)	2.893	0.235
Household income per month				
Low income	114	78.1 (72.5, 83.7)		
Medium income	33	70.2 (64.1, 76.3)		
High income	66	71.0 (64.9, 77.1)	2.050	0.359

5.4.3.2. Prevalence of children with caries experience by child's early-life behaviours

The prevalence of caries experience in children based on their early-life behaviours is shown in Table 5.12. Children who started brushing their teeth between 12 to 24 months had the highest prevalence of caries experience (87.0%; 95% CI: 82.6 to 91.4%) with **no statistically significant difference** ($p = 0.128$). Those brushing less than twice a day at age 2 to 3 had a higher prevalence (77.5%; 95% CI: 72.2 to 82.8%) compared to those brushing twice or more, with a **non-significant difference** ($p = 0.163$). Prevalence of caries experience was slightly higher in children brushing their own teeth (74.4%; 95% CI: 68.8 to 80.0%) compared to those with adult supervision and this **difference was non-significant** ($p = 0.830$). Children who stopped breastfeeding at 24 months or later had the highest prevalence (81.3%; 95% CI: 76.3 to 86.3%) with **no significant difference** ($p = 0.053$). Finally, children who never visited a dentist had the lowest prevalence (60.9%), with a **significant difference** ($p = 0.004$).

Table 5.12 Prevalence of children with $dmft > 0$ by early-life behavioural characteristics

Variable/ category	n	Prevalence (%) of dmft > 0 (95% C.I.)	Chi-sq	p-value
Age start brushing				
6 months and below	95	69.9 (63.9, 75.9)	5.682	0.128
6 to 12 months	76	71.0 (65.1, 76.9)		
12 to 24 months	40	87.0 (82.6, 91.4)		
24 months and above	17	68.0 (61.9, 74.1)		
Frequency of brushing per day at age 2-3				
Less than twice	93	77.5 (72.2, 82.8)	1.946	0.163
Twice and more	145	70.4 (64.6, 76.2)		
Toothbrushing supervision at age 2-3				
No supervision	29	74.4 (68.8, 80.0)	0.046	0.830
Parental supervision	208	72.7 (67.0, 78.4)		
Age of stopping breastfeeding				
12 months and below	125	69.8 (63.9, 75.7)	5.863	0.053
More than 12 months	33	64.7 (58.6, 70.8)		
24 months or more	78	81.3 (76.3, 86.3)		
Age of first dental visit				
Below 12 months (ref)	17	70.8 (65.0, 76.6)	11.047	0.004
12 months and above	167	79.2 (74.1, 84.3)		
Never visited	56	60.9 (54.7, 67.1)		

5.4.3.3. Prevalence of children with caries experience by child's current oral health behaviours

Among children who brushed their teeth twice or more daily, the prevalence of caries experience was 77.4% (95% CI: 72.1 to 82.7%), slightly higher than those who brushed less than twice daily, with a **non-statistically significant difference** ($p = 0.547$) (Table 5.13). Children using non-fluoridated toothpaste had the highest prevalence (80.0%; 95% CI: 75.0 to 85.0%) within the type of toothpaste category, and this **difference was significant** ($p = 0.004$). Meanwhile, children using a smear layer had the highest prevalence (79.5%; 95% CI: 74.4 to 85.0%) in their group, though the **difference was not significant** ($p = 0.588$). After brushing, those who swallowed, rinsed, and spat had a higher prevalence of caries experience (73.1%; 95% CI: 67.5 to 78.7%) compared to those who just spat, with a **non-significant difference** ($p = 0.680$).

The prevalence of caries experience increased with the frequency of sugary food intake, from 71.6% (95% CI: 65.7 to 77.5%) for those consuming it once or less per day to 73.5% (95% CI: 67.8 to 79.2%) for those consuming it four times or more. Similarly, the prevalence was highest (78.0%; 95% CI: 71.9 to 84.1%) among children drinking sugary beverages four times or more daily. Finally, children who did not visit a dentist in the last two years had a lower prevalence of caries experience (71.6%; 95% CI: 66.1 to 77.1%) compared to those who had visited. Overall, the groups within these three categories **did not show any significant difference** ($p > 0.05$).

Table 5.13 Prevalence of children with dmft > 0 by current oral health behavioural characteristics

Variable/ category	n	Prevalence (%) of dmft > 0 (95% C.I.)	Chi-sq	p-value
Frequency of brushing per day at present				
Less than twice	39	76.5 (71.1, 81.9)	0.363	0.547
Twice and more	202	77.4 (72.1, 82.7)		
Type of toothpaste used				
Fluoridated adult toothpaste	204	77.0 (71.7, 82.3)	11.305	0.004
Fluoridated child toothpaste	31	55.4 (49.2, 61.6)		
Non-fluoridated toothpaste	8	80.0 (75.0, 85.0)		
Amount of toothpaste used				
Full length of brush head	73	73.7 (68.2, 79.2)	1.064	0.588
Pea size	141	71.6 (66.0, 77.2)		
Smear layer	31	79.5 (74.4, 84.6)		
Habit after brushing				
Swallow or rinse and spit	217	73.1 (67.5, 78.7)	0.170	0.680
Just spit	23	69.7 (63.9, 75.5)		
Frequency of sugary food intake per day				
One time or less	151	71.6 (65.7, 77.5)	0.220	0.896
Two or three times	52	74.3 (68.6, 80.0)		
Four times or more	25	73.5 (67.8, 79.2)		
Frequency of sugary drink intake per day				
One time or less	35	66.0 (59.0, 73.0)	2.752	0.253
Two or three times	56	75.7 (69.4, 82.0)		
Four times or more	85	78.0 (71.9, 84.1)		
Dental attendance in the last two years				
Had visited	114	75.5 (70.3, 80.7)	0.683	0.409
No visit	146	71.6 (66.1, 77.1)		

5.4.3.4. Severity of caries experience by sociodemographic characteristics

Table 5.14 shows that the mean dmft for all children was 5.12 (95% CI: 4.57 to 5.67). Males had a higher mean dmft (5.29; 95% CI: 4.49 to 6.09) compared to females, though the difference was **not statistically significant** ($p = 0.498$). Among ethnic groups, Brunei Malay children had the highest mean dmft (5.43; 95% CI: 4.77 to 6.09), while children of other ethnic backgrounds had the lowest mean dmft (2.83; 95% CI: 1.44 to 4.22), with this **difference being significant** ($p = 0.017$). By district, Brunei Muara had the highest mean dmft (5.24; 95% CI: 4.58 to 5.90) and the **difference was not significant** ($p = 0.855$). Government school children had a higher mean dmft (6.11; 95% CI: 5.28 to 6.94) compared to private school children, with a **significant difference** ($p < 0.001$). Children with parents who had secondary education or below (5.62; 95% CI: 4.73 to 6.51) and those from low-income families (5.85; 95% CI: 4.92 to 6.78) had the highest mean dmft within their respective categories. However, the groups within these categories **did not show any significant difference** ($p > 0.05$).

Table 5.14 Severity of caries experience among children by sociodemographic characteristics

Variable/ category	n	Mean of dmft (95% C.I.)	(Q1, Med, Q3) of dmft	M-W Z/ K-W Chi-sq	p-value
All children	355	5.12 (4.57, 5.67)	(0, 3, 9)	-	-
Sex					
Male	175	5.29 (4.49, 6.09)	(1, 3, 9)		
Female	180	4.95 (4.19, 5.71)	(0, 3, 8)	0.677	0.498
Child ethnicity					
Brunei Malay	257	5.43 (4.77, 6.09)	(1, 4, 9)		
Chinese	37	3.84 (2.09, 5.59)	(0, 2, 6)		
Other	24	2.83 (1.44, 4.22)	(0, 2, 5)	8.120	0.017
District					
Brunei Muara	259	5.24 (4.58, 5.90)	(0, 3, 9)		
Tutong	20	5.23 (2.63, 7.87)	(0, 4, 9)		
Belait	66	4.88 (3.67, 6.09)	(0, 4, 8)		
Temburong	10	3.30 (0.80, 5.80)	(0, 3, 6)	0.788	0.855
School type					
Government	168	6.11 (5.28, 6.94)	(2, 4, 10)		
Private	187	4.22 (3.52, 4.93)	(0, 2, 7)	3.641	<0.001
Highest education of one parent					
Secondary or below	155	5.62 (4.73, 6.51)	(0, 4, 10)		
Vocational, A level, HND	87	5.08 (3.98, 6.18)	(1, 4, 9)		
Bachelor's degree or above	83	4.01 (3.04, 4.98)	(0, 2, 7)	4.044	0.132
Household income per month					
Less than B\$2,000	146	5.85 (4.92, 6.78)	(1, 4, 10)		
B\$2,000 to 2,999	47	4.89 (3.34, 6.45)	(0, 2, 9)		
B\$3,000 and above	93	4.22 (3.29, 5.14)	(0, 3, 7)	4.235	0.120

5.4.3.5. Severity of caries experience by child's early-life behaviours

Table 5.15 demonstrates that children who started brushing their teeth between 12 to 24 months had the highest mean dmft (5.85; 95% CI: 4.42 to 7.27), while those who started brushing at 6 months and below had the lowest mean dmft (4.50; 95% CI: 3.65 to 5.35), with a **non-statistically significant difference** ($p = 0.146$). Children who brushed less than twice per day at age 2 to 3 had a higher mean dmft (5.26; 95% CI: 4.34 to 6.18) than those who brushed twice or more daily, with a **non-significant difference** ($p = 0.251$). When children brushed their own teeth at age 2 to 3, the mean dmft was 5.23 (95% CI: 3.56 to 6.91), compared to those with adult supervision, and this **difference was not significant** ($p = 0.767$). Regarding the age of stopping breastfeeding, children who stopped at 24 months or more had the highest mean dmft (5.22; 95% CI: 4.24 to 6.20), with a **non-significant difference** ($p = 0.203$). Lastly, the age of the first dental visit showed a **significant difference** ($p < 0.001$), with children who visited a dentist at 12 months and below having the highest mean dmft (4.42; 95% CI: 2.08 to 6.75).

Table 5.15 Severity of caries experience among children by early-life behavioural characteristics

Variable/ category	n	Mean of dmft (95% C.I.)	(Q1, Med, Q3) of dmft	M-W Z/ K-W Chi-sq	p-value
Age start brushing					
6 months and below	136	4.50 (3.65, 5.35)	(0, 3, 7)		
6 to 12 months	107	5.40 (4.37, 6.43)	(0, 4, 9)		
12 to 24 months	46	5.85 (4.42, 7.27)	(2, 5, 9)		
24 months and above	25	4.68 (2.01, 7.35)	(0, 2, 6)	5.381	0.146
Frequency of brushing per day at age 2-3					
Less than twice	120	5.26 (4.34, 6.18)	(1, 4, 9)		
Twice and more	206	4.79 (4.08, 5.50)	(0, 3, 8)	1.149	0.251
Toothbrushing supervision at age 2-3					
No supervision	39	5.23 (3.56, 6.91)	(0, 3, 10)		
Adult supervision	286	4.96 (4.36, 5.56)	(0, 3, 9)	0.296	0.767
Age of stopping breast feeding					
12 months and below	179	5.17 (4.37, 5.98)	(0, 3, 9)		
More than 12 months	51	4.04 (2.62, 5.46)	(0, 2, 6)		
24 months or more	96	5.22 (4.24, 6.20)	(1, 4, 9)	3.186	0.203
Age of first dental visit					
Below 12 months	24	4.42 (2.08, 6.75)	(0, 2, 6)		
12 months and above	211	5.94 (5.21, 6.66)	(1, 4, 10)		
Never visit	92	3.38 (2.48, 4.28)	(0, 2, 5)	18.140	<0.001

5.4.3.6. Severity of caries experience by child's current oral health behaviours

Children who brushed less than twice daily had a higher mean dmft (5.99; 95% CI: 4.27 to 7.69) compared to those who brushed twice or more times and this **difference was not statistically significant** ($p = 0.372$) (Table 5.16). Children using non-fluoridated toothpaste had the highest mean dmft (5.90; 95% CI: 2.66 to 9.14) within its category, with a **significant difference** ($p = 0.017$). Regarding the amount of toothpaste used, children who applied a smear layer on their toothbrushes had the highest mean dmft (5.19; 95% CI: 3.44 to 6.92), but the **difference was not significant** ($p = 0.928$). Meanwhile, those who swallowed, rinsed and spat had a higher mean dmft (5.08; 95% CI: 4.48 to 5.67) compared to those who only spat, but again, the **difference was not significant** ($p = 0.380$). Children who consumed sugary foods once or less daily (5.30; 95% CI: 4.57 to 6.03) and who consumed sugary beverages four or more times daily (5.51; 95% CI: 4.49 to 6.54) showed the highest mean dmft within their respective categories. Additionally, children who had visited a dentist in the last two years had a higher mean dmft (5.75; 95% CI: 4.88 to 6.62) compared to those who had never visited. The differences between the groups within these three categories were **not significant** ($p > 0.05$).

Table 5.16 Severity of caries experience among children by current oral health behavioural characteristics

Variable/ category	n	Mean of dmft (95% C.I.)	(Q1, Med, Q3) of dmft	M-W Z/ K-W Chi-sq	p-value
Frequency of brushing per day at present					
Less than twice	51	5.99 (4.27, 7.69)	(1, 3, 11)	0.892	0.372
Twice and more	279	4.91 (4.31, 5.51)	(0, 3, 9)		
Type of toothpaste used					
Fluoridated adult toothpaste	265	5.30 (4.67, 5.93)	(1, 3, 9)	8.162	0.017
Fluoridated child toothpaste	56	3.88 (2.40, 5.35)	(0, 1, 7)		
Non fluoridated toothpaste	10	5.90 (2.66, 9.14)	(3, 6, 8)		
Amount of toothpaste used					
Full length of brush head	99	4.80 (3.81, 5.78)	(0, 3, 9)	0.150	0.928
Pea size	197	5.18 (4.43, 5.95)	(0, 3, 9)		
Smear layer	39	5.19 (3.44, 6.92)	(1, 3, 9)		
Habit after brushing					
Swallow, rinse and spit	297	5.08 (4.48, 5.67)	(0, 3, 9)	0.879	0.380
Just spit	33	4.24 (2.49, 6.00)	(0, 2, 7)		
Frequency of sugary food intake per day					
Once or less per day	211	5.30 (4.57, 6.03)	(0, 3, 9)	1.693	0.420
Two or three times	70	4.30 (3.25, 5.35)	(0, 3, 7)		
Four times or more	34	3.97 (2.40, 5.54)	(0, 2, 6)		
Frequency of sugary drink intake per day					
Once or less per day	53	3.85 (2.52, 5.18)	(0, 2, 7)	4.949	0.084
Two or three times	74	4.89 (3.82, 5.97)	(1, 4, 8)		
Four times or more	109	5.51 (4.49, 6.54)	(2, 3, 10)		
Dental attendance in the last two years					
Had visited	151	5.75 (4.88, 6.62)	(1, 4, 10)	1.891	0.059
No visit	204	4.65 (3.95, 5.35)	(0, 3, 8)		

5.4.4. Logistic regression analysis

5.4.4.1. Analysis of each early-life behaviour with the prevalence of dmft > 0 in children, then sequentially adjusting for sociodemographic variables

Table 5.17 shows the logistic regression model assessing the associations of **each** early-life oral health behaviours with the prevalence of caries experience (i.e. prevalence of dmft > 0) in children when they were 2 to 3 years old. There were **significant positive associations** between the age of started brushing and the prevalence of caries experience across all models. In model 5, children who started brushing between 12 to 24 months **significantly increased the odds of having caries experience** (OR: 4.44; 95% CI: 1.20 to 16.38; $p = 0.025$) compared to those who started brushing before the age of 6 months and below.

Meanwhile, the frequency of daily brushing was **significantly negatively associated** with the prevalence of caries experience in models 2, 3, 4a and 5. The fully adjusted model showed that children who brushed twice or more time daily **decreased the odds of having caries experience** (OR: 0.46; 95% CI: 0.24 to 0.91; $p = 0.026$) compared to those who brushed only once or less per day. There was also a **significant negative association**, only in model 1, between the age of stopping breastfeeding and the prevalence of caries experience. In the unadjusted model, children who stopped breastfeeding at the ages of between 12 and 24 months (OR: 0.42; 95% CI: 0.20 to 0.91; $p = 0.029$) and above 12 months (OR: 0.53; 95% CI: 0.29 to 0.98; $p = 0.042$) **significantly reduced the odds of experiencing caries**. Across all models, there were **no significant associations** ($p > 0.05$) between these oral health behaviours, particularly toothbrushing supervision and the age of the first dental visit, and the prevalence of caries experience.

Table 5.17 Logistic regression model to assess the associations of each early-life behaviour with prevalence of children with dmft > 0 and then adjusting for sex, ethnicity, school type, parental education and household income sequentially

OR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Age of start brushing (n = 242)						
6 months and below (ref)						
6 to 12 months	1.06 (0.61, 1.84), p=0.842	1.04 (0.59, 1.86), p=0.886	1.05 (0.58, 1.90), p=0.868	1.09 (0.59, 1.99), p=0.791	0.90 (0.46, 1.73), p=0.742	0.87 (0.45, 1.71), p=0.694
12 to 24 months	2.88 (1.13, 7.31), p=0.026	2.74 (1.06, 7.08), p=0.038	2.84 (1.06, 7.60), p=0.037	2.77 (1.02, 7.53), p=0.045	4.68 (1.29, 16.93), p=0.019	4.44 (1.20, 16.38), p=0.025
24 months and above	0.92 (0.37, 2.29), p=0.853	1.16 (0.41, 3.31), p=0.774	1.15 (0.39, 3.42), p=0.800	1.11 (0.37, 3.35), p=0.857	0.82 (0.25, 2.75), p=0.751	0.78 (0.23, 2.67), p=0.696
Frequency of brushing per day at age 2-3 (n = 252)						
Less than twice (ref)						
Twice and more	0.69 (0.41, 1.16), p=0.164	0.57 (0.32, 0.99), p=0.047	0.55 (0.31, 0.97), p=0.039	0.47 (0.26, 0.85), p=0.012	0.53 (0.28, 1.02), p=0.059	0.46 (0.24, 0.91), p=0.026
Toothbrushing supervision at age 2-3 (n = 252)						
No supervision (ref)						
Adult supervision	0.92 (0.43, 1.97), p=0.830	0.94 (0.42, 2.10), p=0.880	0.96 (0.42, 2.17), p=0.913	0.82 (0.34, 1.98), p=0.654	1.23 (0.47, 3.18), p=0.673	1.01 (0.36, 2.86), p=0.988
Age of stopping breastfeeding (n = 247)						
24 months or more (ref)						
Between 12 and 24 months	0.42 (0.20, 0.91), p=0.029	0.47 (0.21, 1.05), p=0.066	0.52 (0.23, 1.17), p=0.115	0.56 (0.24, 1.30), p=0.177	0.80 (0.31, 2.05), p=0.638	0.82 (0.31, 2.17), p=0.690
12 months and below	0.53 (0.29, 0.98), p=0.042	0.63 (0.33, 1.21), p=0.164	0.71 (0.37, 1.39), p=0.317	0.78 (0.39, 1.54), p=0.474	0.68 (0.33, 1.40), p=0.294	0.74 (0.35, 1.54), p=0.419
Age of first dental visit (n = 255)						
Below 12 months (ref)						
12 months and above	1.56 (0.61, 4.00), p=0.352	2.04 (0.77, 5.41), p=0.155	2.37 (0.85, 6.62), p=0.100	2.64 (0.93, 7.51), p=0.068	1.66 (0.50, 5.49), p=0.405	1.80 (0.53, 6.06), p=0.343
Never visit	0.64 (0.24, 1.70), p=0.370	0.86 (0.31, 2.40), p=0.779	0.96 (0.33, 2.80), p=0.937	1.04 (0.35, 3.10), p=0.939	0.71 (0.20, 2.50), p=0.598	0.75 (0.21, 2.66), p=0.653

Model 1: unadjusted; Model 2: adjusted for sex and ethnicity; Model 3: adjusted for sex, ethnicity and school type; Model 4a: adjusted for sex, ethnicity, school type and parental education; Model 4b: adjusted for sex, ethnicity, school type and household income; Model 5: Fully adjusted

5.4.4.2. Analysis of each current oral health behaviour with the prevalence of dmft > 0 in children, then sequentially adjusting for sociodemographic variables

Table 5.18 examines the associations between **each** current oral health behaviour and the prevalence of caries experience in children when they were 5 years old. Type of toothpaste used was the only variable that shows a **significant negative association** with the prevalence of caries experience, specifically in models 1 to 3. Children who brushed twice or more per day at age 5 **significantly reduced the odds of having caries experience** in model 1 (OR: 0.39; 95% CI: 0.20 to 0.78; $p = 0.007$), model 2 (OR: 0.37; 95% CI: 0.20 to 0.68; $p = 0.001$) and model 3 (OR: 0.41; 95% CI: 0.20 to 0.83; $p = 0.013$) compared to those who brushed once or less per day. Meanwhile, the prevalence of caries experience was **not significantly associated** ($p > 0.05$) with the frequency of daily brushing, the frequency of sugary food and drink intake per day and the dental attendance in the past two years.

Table 5.18 Logistic regression model to assess the associations of each current oral health behaviours with prevalence of children with dmft > 0 and then adjusting for sex, ethnicity, school type, parental education and household income sequentially

OR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Frequency of brushing per day at present (n = 301)						
Less than twice (ref)						
Twice and more	0.81 (0.40, 1.62), p=0.548	0.73 (0.35, 1.53), p=0.407	0.76 (0.36, 1.62), p=0.480	0.74 (0.34, 1.60), p=0.438	0.65 (0.27, 1.55), p=0.329	0.66 (0.28, 1.59), p=0.357
Type of toothpaste used (n = 256)						
Adult fluoridated (ref)						
Child fluoridated	0.39 (0.20, 0.78), p=0.007	0.37 (0.20, 0.68), p=0.001	0.41 (0.20, 0.83), p=0.013	0.51 (0.25, 1.07), p=0.075	0.60 (0.27, 1.35), p=0.215	0.73 (0.32, 1.70), p=0.470
Non-fluoridated	1.02 (0.20, 5.24), p=0.979	1.20 (0.25, 5.78), p=0.824	0.79 (0.15, 4.11), p=0.780	0.88 (0.17, 4.59), p=0.877	1.52 (0.17, 13.48), p=0.705	1.66 (0.19, 14.79), p=0.651
Frequency of sugary food intake per day (n = 230)						
Once or less per day (ref)						
Two or three times	0.89 (0.13, 6.00), p=0.904	1.77 (0.21, 15.02), p=0.603	1.90 (0.21, 17.03), p=0.567	2.24 (0.25, 20.08), p=0.470	2.82 (0.30, 26.74), p=0.366	3.14 (0.33, 30.24), p=0.322
Four times or more	2.10 (0.34, 12.97), p=0.424	3.47 (0.46, 26.16), p=0.227	3.65 (0.47, 28.54), p=0.218	4.12 (0.53, 31.80), p=0.175	4.62 (0.57, 37.12), p=0.151	5.51 (0.69, 43.98), p=0.108
Frequency of sugary drink intake per day (n = 230)						
Once or less per day (ref)						
Two or three times	1.60 (0.73, 3.48), p=0.236	1.74 (0.75, 4.02), p=0.196	1.61 (0.68, 3.82), p=0.280	1.75 (0.71, 4.31), p=0.223	2.62 (0.95, 7.22), p=0.064	2.82 (0.97, 8.22), p=0.057
Four times or more	1.82 (0.88, 3.77), p=0.106	1.57 (0.72, 3.46), p=0.259	1.28 (0.56, 2.95), p=0.555	1.12 (0.47, 2.63), p=0.801	1.39 (0.54, 3.57), p=0.494	1.20 (0.45, 3.21), p=0.712
Dental attendance in the last two years (n = 264)						
Had visited						
No visit	0.82 (0.51, 1.32), p=0.409	0.81 (0.49, 1.35), p=0.417	0.72 (0.43, 1.22), p=0.224	0.68 (0.39, 1.18), p=0.169	0.76 (0.42, 1.36), p=0.353	0.74 (0.41, 1.34), p=0.321

Model 1: unadjusted; Model 2: adjusted for sex and ethnicity; Model 3: adjusted for sex, ethnicity and school type; Model 4a: adjusted for sex, ethnicity, school type and parental education; Model 4b: adjusted for sex, ethnicity, school type and household income; Model 5: Fully adjusted

5.4.5. ZINB analysis

5.4.5.1. Analysis of each early-life behaviour with the severity of caries experience in children

Appendix 3 presents the ZINB regression model assessing the associations of each early-life oral health behaviour with the severity of caries experience in children aged 2 to 3 years. In the Negative Binomial portion (Count model), **none of the variables showed any significant associations** ($p > 0.05$) with the severity of caries experience.

In the Zero-inflated portion (Caries-free model), there was a **significant positive association** between the frequency of brushing and the prevalence of having no caries experience across all models. In model 5, children who brushed twice or more daily had **significantly increased odds of having no caries experience** (OR: 4.89; 95% CI: 1.65 to 14.51; $p = 0.004$) compared to those who brushed once or less daily. Meanwhile, there was a **significant negative association** between toothbrushing supervision and the prevalence of having no caries experience. This significant association was observed only in model 4b, where children who were supervised during brushing had **significantly reduced odds of having no caries experience** (OR: 0.12; 95% CI: 0.02 to 0.63; $p = 0.012$) compared to those who were not under adult supervision. From models 1 to 5, the prevalence of having no caries experience **was not significantly associated** ($p > 0.05$) with the age of starting toothbrushing, the age of stopping breastfeeding or the age of the first dental visit.

5.4.5.2. Analysis of each current oral health behaviour with the severity of caries experience in children

Despite conducting the ZINB regression analysis to assess the associations of each current oral health behaviour with the severity of caries experience in children aged 5 years, **none of the behaviours showed any significant associations** ($p > 0.05$) with either the severity of caries experience or the prevalence of having no caries experience.

5.4.6. Summary of the results

The results from the secondary analysis of subsample data of the 2015 CNOHS are shown below.

5.4.6.1. General findings

The **prevalence** of 5-year-old children in Brunei Darussalam who had caries experience (i.e. dmft > 0) was 73.2%. Meanwhile, the **severity** of caries experience (i.e. mean dmft) in 5-year-old children was 5.12 (95% CI: 4.57 to 5.67).

5.4.6.2. Sociodemographic characteristics

5.4.6.2.1. Descriptive data analysis results

- Those who were from the Brunei Malay ethnicity had a **higher severity of caries experience** (dmft: 5.43; 95% CI: 4.77 to 6.09) than Chinese and other ethnicities. This difference was significant ($p = 0.017$)
- Children attending government schools had a **higher prevalence** (81.0%; 95% CI: 76.2 to 85.8%) and **severity** (dmft: 6.11; 95% CI: 5.28 to 6.94) **of caries experience** compared to those attending private schools. These differences were significant ($p = 0.02$ and $p < 0.001$, respectively)

5.4.6.2.2. Interpretation of these results

- There were **significant positive associations** between ethnicities and school types and caries experience, with attending government schools and being of Brunei Malay ethnicity **significantly associated with higher caries experience**

5.4.6.3. Child's early-life behaviours

5.4.6.3.1. *Descriptive data analysis results*

- Children who started visiting the dentist at 12 months and above had a **higher prevalence** (79.2%; 95% CI: 74.1 to 84.3%) and **severity of caries experience** than those who started visiting at age 12 months or below, and those who never visited a dentist. These differences were significant ($p = 0.004$ and $p < 0.001$, respectively)

5.4.6.3.2. *Logistic analysis results (Based on fully adjusted models)*

- Children who started brushing at the age of 12 to 24 months **significantly increased the odds of having caries experience** (OR: 4.44; 95% CI: 1.20 to 16.38; $p = 0.025$) compared to those who started brushing before the age of 6 months
- Children who brushed twice or more per day at ages 2 to 3 **significantly reduced the odds of having caries experience** (OR: 0.46; 95% CI: 0.24 to 0.91; $p = 0.026$) compared to those who brushed only once or less per day

5.4.6.3.3. *ZINB regression analysis results (Based on fully adjusted models)*

Count model

- The analysis of the count model did not identify any significant associations between the variables tested and the severity of caries experience

Caries-free model

- Children who brushed twice or more times per day when they were 2 to 3 years old **significantly increased the odds of being free from caries experience** (OR: 4.89; 95% CI: 1.65 to 14.51; $p = 0.004$) compared to those who brushed once or less per day

5.4.6.3.4. Interpretation of these results

- There was a **significant positive association** between a child's early-life behaviours (particularly the age of the first dental visit and the age of starting brushing) and caries experience. Specifically, children who started visiting dentists before the age of 12 months and those who started brushing at the age of 12 to 24 months were **significantly associated with higher caries experience**
- Meanwhile, there was a **significant negative association** between the frequency of brushing per day at age 2 to 3 and caries experience. Children who brushed twice or more per day were **significantly associated with lower caries experience**

5.4.6.4. Child's current oral health behaviours

5.4.6.4.1. Descriptive data analysis results

- Children who used non-fluoridated toothpaste had a **higher prevalence** (80.0%; 95% CI: 75.0 to 85.0%) and **severity** (dmft: 5.90; 95% CI: 2.66 to 9.14) **of caries experience** than those who used fluoridated child and adult toothpastes. This difference was significant ($p = 0.017$).

5.4.6.4.2. Logistic analysis results (Based on fully adjusted models):

- The analysis did not identify any significant associations between the variables tested and the prevalence of caries experience

5.4.6.4.3. ZINB regression analysis results (Based on fully adjusted models):

Count model

- The analysis of the count model did not identify any significant associations between the variables tested and the prevalence of caries experience

Caries-free model

- Children who brushed twice or more times per day when they were 2 to 3 years old **significantly increased the odds of being free from caries experience** (OR: 4.89; 95% CI: 1.65 to 14.51; $p = 0.004$) compared to those who brushed once or less per day.

5.4.6.4.4. Interpretation of these results:

- There was a **significant positive association** between the types of toothpaste used and caries experience. Children who used non-fluoridated toothpaste were **significantly associated with higher caries experience**
- Meanwhile, there was a **significant negative association** between the frequency of brushing per day at age 5 and caries experience. Children who brushed twice or more per day were **significantly associated with lower caries experience**

Chapter 6

**Study 2: Assessment of the associations of early-life behaviours and current oral health behaviours and caries among children from the current oral epidemiological survey
- A quantitative study**

6.1. Introduction

This second study of the thesis involves a primary data analysis of the data collected from the current oral epidemiological survey on children aged 5 years in Brunei Darussalam. The data from Study 1 revealed a significant amount of missing data for variables, including ‘age of stopping breastfeeding’ (12.7%) and ‘frequency of daily consumption of SSBs’ (33.5%).

Possible reasons for the missing data associated with these variables include long response lists to some questions, irrelevant questions and an impersonal approach to the parental-completed questionnaire (Appendix 2). If these variables had been considered in the main complete-case analysis for their associations with the primary outcomes, the analysis results would have had greater statistical power and significant bias in parameter estimation. Therefore, the principal investigator of this thesis conducted a complete data analysis for other oral health-related behaviours (with data missingness < 10%) to assess their associations with the primary outcomes in Study 1.

It was decided that a modified version of the validated questionnaire from the 2015 CNOHS be used for Study 2 with the hope of reducing the number of missing data. The Department of Dental Services, Ministry of Health and ARCPOH developed and validated the original questionnaire. The Department of Dental Services granted permission to use and modify this questionnaire (Table 6.1).

Table 6.1 Questions in the modified version of the validated questionnaire from the 2015 CNOHS

No	Questions in the questionnaire used for this study	Comment
1	Overall, would you say that the health of your child's teeth and mouth is very good/ good/ poor/ very poor	These questions were validated and taken from the 2013 Dental Health Survey of Children and Young People of the UK*
2	How old was your child when they started brushing his/ her teeth or having them brushed for them?	
3	How often does your child usually brush his/ her teeth (or have them brushed for them)?	
4	Who usually brushes your child's teeth nowadays?	
5	What is the name of the toothpaste your child is currently using?	
6	How much toothpaste does your child (or do you) usually use on their toothbrush?	
7	After tooth brushing, does your child usually	
8	8) Please indicate the type of milk your child consumed from birth to 6 months of age	
9	Please indicate the type of milk your child consumed from 6 to 12 months.	
10	Please indicate the type of milk your child consumed from 12 to 24 months of age	
11	Estimate at what age your child stopped receiving breast milk	
12	How many times a day does your child usually eat the following	These questions were validated and taken from the 2013 Dental Health Survey of Children and Young People of the UK*
13	How many times a day does your child usually drink the following	
14	How old was your child when they first visited a dentist or dental nurse for a dental check-up (not including an emergency visit due to pain) for their oral health?	
15	When did your child last see a dentist or dental nurse for his/ her oral health?	
16	How often does your child visit a dentist or dental nurse for dental care?	
17	To what ethnic group does your child belong?	
18a	What is the highest level of education you have?	
18b	What is your current employment status?	
18c	What is your household income per month?	

*The 2013 Dental Health Survey of Children and Young People of the UK. Available at:
https://doc.ukdataservice.ac.uk/doc/7774/mrdoc/pdf/7774_cdhs_2013_questionnaires.pdf

6.2. Study aims

The primary aims of this second study were:

- to examine the prevalence and severity of caries experience in 5-year-old children participating in the oral epidemiological survey conducted in 2023
- to assess if there were any significant associations between caries experience in 5-year-old children and their oral health behaviours when they were 2 to 3 years old
- to assess if there were any significant associations between caries experience in 5-year-old children and their current oral health behaviours

Meanwhile, the secondary aim of this study was:

- to assess if there were any significant associations between caries experience in 5-year-old children and their sociodemographic characteristics

6.3. Methods

6.3.1. Study design

This is a cross-sectional oral epidemiological survey of a representative sample of 5-year-old children residing in Brunei-Muara District during the 2023 school year. This specific age group was selected to allow comparison with data from the previous 2015 CNOHS and aligns with the age group specified by the WHO for oral epidemiological surveys.

6.3.2. Study setting

The study was conducted in Brunei-Muara District only. This district was chosen because nearly three-quarters (75%) of the country's population lives in this smallest district of the country.

6.3.3. Study participants

The study focused on a target population of 5-year-old children attending a random selection of kindergartens or primary schools, encompassing both from government and private institutions, within Brunei-Muara District from July to September 2023.

6.3.3.1. Inclusion criteria

The child was included if:

- he or she was 5 years old and had not yet reached his or her sixth birthday on the day of the dental examination
- the parent or guardian consented for the child's participation in the survey

6.3.3.2. Exclusion criteria

The child was excluded if:

- he or she was 6 years old during the day of the dental examination
- there was no consent given from the parent or guardian the child
- suddenly refused to have the dental examination during the examination day

6.3.3.3. Sampling strategy and sample size

This oral epidemiological study followed sampling guidance from the British Association for the Study of Community Dentistry, BASCD [4]. The sampling strategy stages are detailed in Appendix 4. The sample size was determined by maximising the size required for examining dmft in 5-year-old children. Based on the enrolled population of 5-year-olds in Brunei-Muara District in 2018, totalling 4,888 children and considering data from the latest NOHS conducted in 2015, the following parameters were considered: a prevalence of dmft greater than zero at 74.1%, a precision of 5%, a design effect of 1.3 (due to cluster sampling) and an additional 20% for potential non-responses. The minimum sample size required was estimated to be 335 children aged five years.

6.3.4. Process in obtaining ethical approval

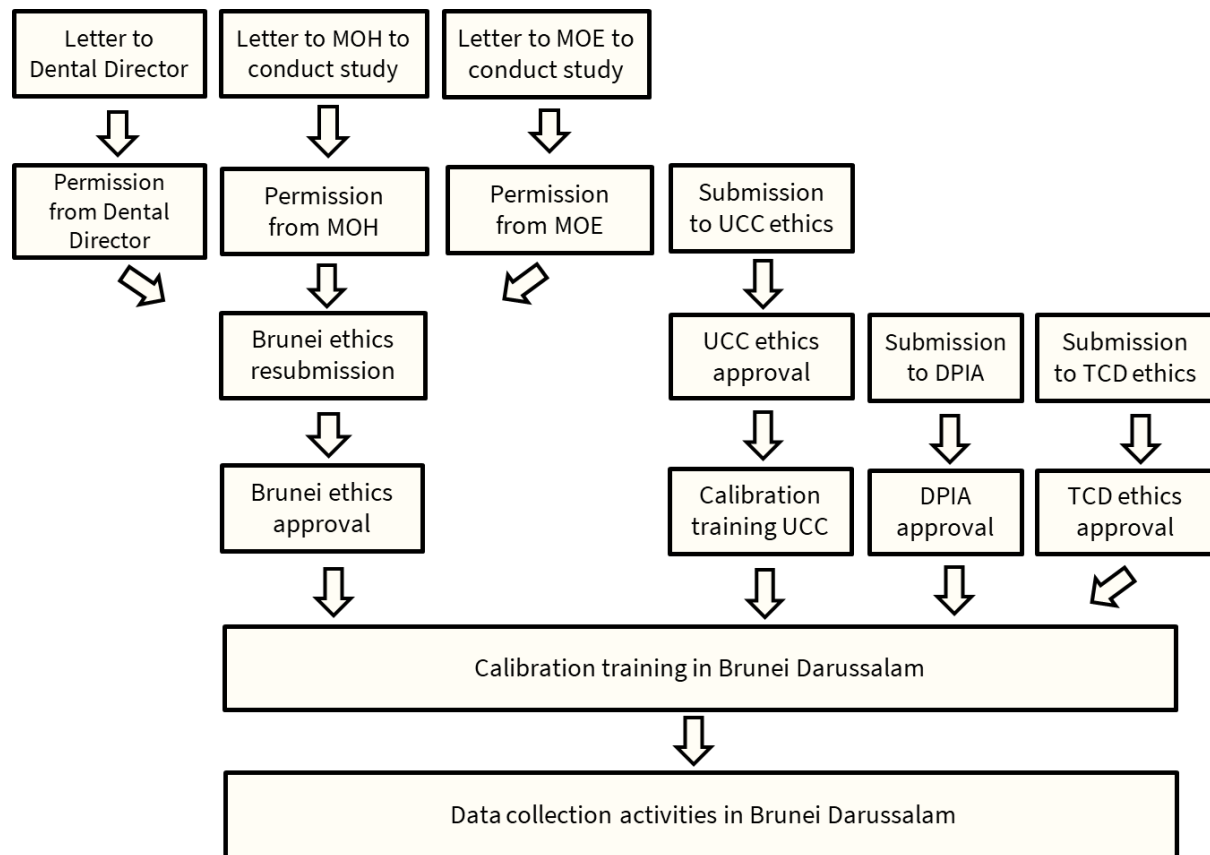


Figure 6.1 Flow diagram showing the process of obtaining permissions from relevant stakeholders for data collection

Permissions were sought from relevant stakeholders to conduct the study in Brunei Darussalam (Figure 6.1) and these include permissions from:

- the Director of the Department of Dental Services (Appendix 5) to:
 - use the 2015 CNOHS questionnaires and modify the questions for the current study
 - use the 2015 CNOHS data for secondary analysis purposes
 - involve dental staff in assisting with the data collection activities
 - utilise relevant dental facilities for the dental examination
- the Deputy Permanent Secretary of the Ministry of Health to conduct the study (Appendix 6); with the English translation (Appendix 8)
- the Deputy Permanent Secretary of the Ministry of Education to survey Primary Schools (Appendix 7); with the English translation (Appendix 8)
- University College Cork (UCC) Research Ethics Committee to conduct calibration training in the Dental School of UCC

This study was ethically reviewed and approved by:

- Medical and Health Research Ethics Committee, Brunei on 19-04-2023 (Project Reference Number: MHREC/MOH/2023/3(1)) (Appendix 9)
- Trinity College Dublin Research Ethics Committee on 07-07-2023 (Project Reference Number: 221104) (Appendix 10)
- Data Protection Impact Assessment approval from the Data Protection Officer in Trinity College Dublin

6.3.5. Calibration training

Initially, the principal investigator of this thesis, who was also the first dental examiner, underwent training and calibration in UCC, Ireland. The principal investigator and other examiners adhered to a standardised protocol provided by BASCD, conducting the dental examination in accordance with the guidelines outlined in the WHO's fifth edition of "Oral Health Surveys: Basic Methods." [61]. This calibration training was conducted in mid-May 2023. In July, he then trained and calibrated the second dental examiner, i.e. a qualified and registered Dental Hygienist and Therapist in Brunei Darussalam. Three dental recorders (qualified and registered Dental Nurses) were also trained.

Inter-examiner reliability between the two dental examiners was assessed by examining a sample of 10% of children within the randomly selected schoolchildren (i.e. 36 children). The inter-examiner reliability assessment was conducted in two separate schools at two-day intervals (i.e. 18 children from each school). According to Cohen, the Kappa coefficient for the inter-examiner reliability should be at least 80% [64]. Intra-reliability assessments for both examiners were also conducted on 10% of the children on different days. The overall Kappa coefficient between examiners was 93%. Meanwhile, the overall intra-examiner reliability kappa score was 95%.

6.3.6. Process in obtaining parental consent

All randomly selected schools were invited to participate in the survey through an invitation letter sent to the head teachers (Appendices 11 and 12). The dental survey team sent out survey packets labelled with unique child's identification numbers, containing paper-based invitation letters (Appendices 13 and 14), PILs (Appendices 15 and 16), consent forms (Appendices 17 to 18) and parental-completed questionnaires (Appendices 19 to 20) to all sampled children in randomly selected schools. The teachers were responsible for distributing these packets to the sampled children. All documents were available in Malay and English versions, in which they were cross-checked for validity in terms of back-to-back translation by the Language and Literature Bureau in Brunei Darussalam (Appendix 21).

6.3.7. Clinical examination

The dental examinations for 5-year-old children were conducted onsite in participating schools from mid-July to end of September 2023 by following the “Clinical Examination Manual for 5-year-old children in Brunei Darussalam” (Appendix 22). The procedures involved were as follows:

- the participant lied down on a portable reclining dental chair
- the examiner set behind the participant and used a disposable dental mirror and a portable light source to undertake a visual dental inspection without using dental loupes
- drying of teeth using cotton rolls only
- the examiner described each tooth using BASCD indices recorded by the recorder in the data collection sheet. The indices included assessment of plaque, caries and pufa (perforation, ulceration, fistula and abscess)

6.3.8. Variables

6.3.8.1. Oral health outcomes

In this primary analysis study, the main outcomes (Table 6.2) were:

- the prevalence of 5-year-old children experiencing caries in the deciduous teeth (i.e. proportion of children with dmft > 0)
- the severity of caries experience among 5-year-old children (i.e. mean dmft for all children)

Table 6.2 Outcome variables and their categories for Study 2

Variable	Source	Categorisation for analysis	Type (No. of categories)
Prevalence of children with caries experience (prevalence of dmft > 0)	Created a new variable by categorising based on “dmft > 0”	“dmft = 0” “dmft > 0”	Binary (2)
Severity of caries experience (mean dmft)	Original data from the current epidemiological dataset	0 and above	Continuous

6.3.8.2. Exposures

The early-life and current oral health behaviours as well as demographic characteristics were determined based on self-reported information obtained from the questionnaires.

6.3.8.2.1. *Child’s early-life behaviours*

These early-life behaviours had the potential to influence the prevalence and severity of caries experience among children in Brunei Darussalam (Table 6.3):

Table 6.3 Early-life behavioural variables and their categories for Study 2

Variable	Reponses in the questionnaire	Categorisation for analysis	Type (No. of categories)
Age at which children started toothbrushing	6 month or below	6 months and below	Ordinal (4)
	Between 6 months and 1 year	6 to 12 months	
	Between 1 and 2 years	12 to 24 months	
	- Between 2 and 4 years 4 years or older	24 months and above	
Frequency of daily toothbrushing at ages 2-3	- Less than once - Once	Less than twice	Binary (2)
	- Twice - More than twice	Twice and more	
Toothbrushing supervision at ages 2-3	Child only	No supervision	Binary (2)
	- Adult only - Adult and child together	Parental supervision	
Age at which they stopped breastfeeding	Never had breast milk		
	Less than 12 months old	12 months and below	Ordinal (3)
	12 months to less than 2 years old	Between 12 and 24 months	
	More than 2 years old	24 months or more	
Age of first dental visit	Under 1 year old	Below 12 months	Ordinal (3)
	1 year old 2 years old 3 to 5 years old	12 months and above	
	Never visit	Never visit	

6.3.8.2.2. *Child's current oral health behaviours*

The following current oral health behaviours were also utilised to assess their possible influences on the prevalence and severity of caries experience among children in Brunei Darussalam (Table 6.4):

Table 6.4 *Current oral health behavioural variables and their categories for Study 2*

Variable	Reponses in the questionnaire	Categorisation for analysis	Type (No. of categories)
Frequency of toothbrushing per day at age 5	- Less than once a day - Once a day	Less than twice	Binary (2)
	- Twice a day - More than twice a day	Twice and more	
Toothbrushing supervision at age 5	Child only	Children	Binary (2)
	- Adult only - Adult and child together	Parental supervision	
Type of toothpaste used	'Write a brand name of toothpaste used'	Fluoridated adult	Nominal (3)
		Fluoridated child	
		Non-fluoridated	
Frequency of sugary food intake per day	- Rarely or never - None per day - Once a day	Once or less	Ordinal (3)
	- Two times a day - Three times a day	Two or three times	
	Four or more times a day	Four times or more	
Frequency of SSBs intake per day	- Rarely or never - None per day - Once a day	Once or less	Ordinal (3)
	- Two times a day - Three times a day	Two or three times	
	Four or more times a day	Four times or more	
Dental attendance in the last two years	- Twice a year - Once a year - Once every 2 years - No regular pattern	Had visited	Binary (2)
	No visit in the past 2 years	Never visit	

6.3.8.2.3. Sociodemographic variables

The following sociodemographic variables were also used to assess their possible associations on the prevalence and severity of caries experience among children in Brunei Darussalam (Table 6.5):

Table 6.5 Sociodemographic variables and their categories for Study 2

Variable	Reponses in the questionnaire	Categories for analysis	Type (No. of categories)
Sex	• Male	Male	Binary (2)
	• Female	Female	
Child ethnicity	• Brunei Malay (Brunei, Tutong, Belait, Temburong) • Other Brunei Malay (Dusun, Bisaya, Murut, Kedayan)	Brunei Malay	Nominal (3)
	• Chinese	Chinese	
	• Other Indigenous (Iban, Punan, Kelabit) • Other	Other	
School type	• Government	Government	Binary (2)
	• Private	Private	
Highest level of education of one of the parents	• No formal education • Primary 1-6 • Form 1-5	Secondary or below	Ordinal (3)
	• Technical or Vocational/ National Diploma • A level/ Higher National Diploma (HND)	Vocational, A level and HND	
	• Bachelor’s Degree • Master’s Degree/ Postgraduate Certificate/ • Postgraduate Diploma • PhD or higher	Bachelor’s degree or above	
Household income per month	• Less than B\$1,000 • B\$1,000 – 1,999	Less than B\$2,000	Ordinal (3)
	• B\$2,000 – 2,999	B\$2,000 – 2,999	
	• B\$3,000 – 3,999 • B4,000 and above	B3,000 and above	

6.3.9. Statistical analysis

6.3.9.1. Preparation of data

The outcome variables were as follows: the prevalence of dmft > 0, which was binary and the mean dmft, expressed as counts starting from '0'. The exposures included the age at which children started toothbrushing, the age at which they stopped breastfeeding, the age of their first dental visit and the frequency of daily sugary food intake, all of which were ordinal categorical variables. Meanwhile, the variable 'type of toothpaste used' was a nominal variable with three categories. The frequency of daily SSBs, the frequency of daily toothbrushing at ages 2 to 3 and 5, toothbrushing supervision at ages 2 to 3 and 5 and the pattern of dental attendance in the last two years were binary variables.

The sociodemographic variables included sex and school type, both of which were binary. Meanwhile, child ethnicity was a nominal variable. Finally, the highest level of education of one of the parents and household income per month were ordinal.

6.3.9.2. Descriptive analysis

The associations of the prevalence of dmft > 0 among children with various demographic characteristic, early-life and current oral health behaviours were analysed using the chi-square test. Meanwhile, the associations of the severity of caries experience with various demographic characteristics, early-life and current oral health behaviours were analysed using the Mann-Whitney test for two-group comparisons or the Kruskal-Wallis test for multi-group analyses. All statistical analyses were performed using the Stata version 18 and SPSS version 28 programmes.

6.3.9.3. Regression analysis

Logistic regression models were used to analyse the associations between each oral health behaviour and the ‘prevalence of dmft > 0’. These models were also used to analyse the associations between all combined early-life oral health behaviours (or all combined current oral health behaviours) and the ‘prevalence of dmft > 0’. The reason for this approach is to examine the collective impact of multiple behaviours on the outcome. By analysing the combined effects of early-life and current oral health behaviours, a comprehensive understanding of how these factors influence the ‘prevalence of dmft > 0’ in children aged 5 years could be understood.

Meanwhile, ZINB regression models were utilised to assess the associations between:

- each oral health behaviour and the ‘severity of caries experience’
- all combined oral health behaviours and the ‘severity of caries experience’

All the above-mentioned associations were analysed by running the following models:

- Model 1: The association between each behaviour and ‘severity of caries experience’
- Model 2: Model 1 and adjusted for sex and ethnicity
- Model 3: Model 2 and additionally adjusted for school type
- Model 4a: Model 3 and additionally adjusted for parental education
- Model 4b: Model 3 and additionally adjusted for household income
- Model 5: Model 3 and additionally adjusted for parental education and household income

On a side note, the decision to use the ZINB model was confirmed over Poisson, Negative Binomial and Zero-inflated Poisson models after statistical testing using an additional command known as the “countfit” test, accessed through the ‘spost13_ado’ files [65]. The results of the “countfit” tests are shown in Figures 8 and 9 with a non-normally distributed graph demonstrating excessive dmft count of ‘0’ (Figure 6.2 and Table 6.6).

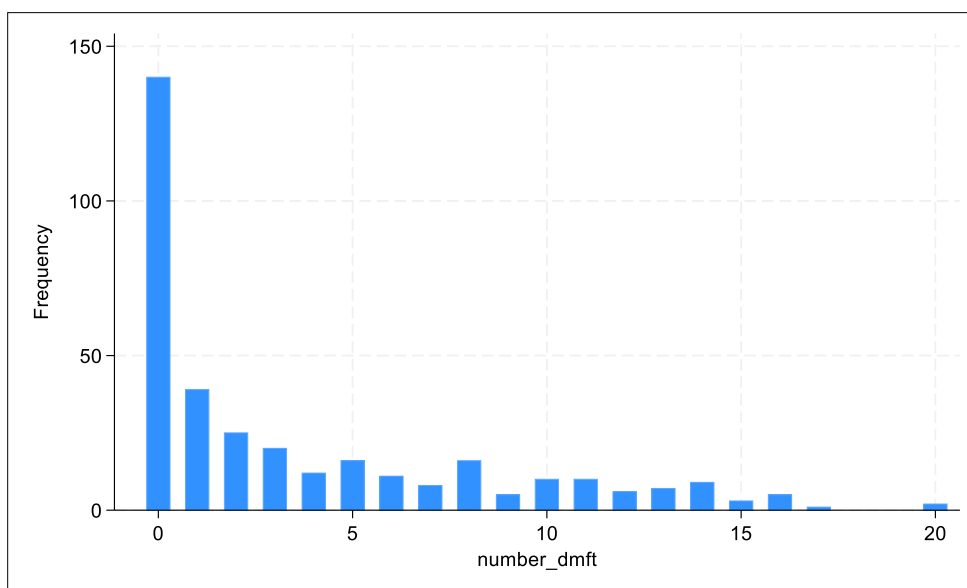


Figure 6.2 Mean severity of caries experience in 5-year-old children in Study 2

Table 6.6 The “countfit” test outcomes supported the selection of the ZINB regression model to assess how variations in early-life and current oral health behaviours affect the severity of caries experience in Study 2

Model comparison	Metric	Value	Difference	Preference	Evidence
PRM					
vs NBRM	BIC	1282.682	569.669	NBRM > PRM	Very strong
	AIC	1239.15	573.296	NBRM > PRM	
	LRX2	575.296	prob = 0.000	NBRM > PRM	p = 0.000
vs ZIP	BIC	1450.019	402.331	ZIP > PRM	Very strong
	AIC	1370.211	442.235	ZIP > PRM	
	Vuong	.	prob = .	ZIP > PRM	p = .
vs ZINB	BIC	1310.949	541.401	ZINB > PRM	Very strong
	AIC	1227.514	584.933	ZINB > PRM	
NBRM					
vs ZINB	BIC	1310.949	-28.267	NBRM > ZINB	Very strong
	AIC	1227.514	11.636	ZINB > NBRM	
	Vuong	.	prob = .	ZINB > PRM	p = .
ZIP					
vs ZINB	BIC	1310.949	139.07	ZINB > ZIP	Very strong
	AIC	1227.514	142.698	ZINB > ZIP	
	LRX2	144.698	prob = 0.000	ZINB > ZIP	p = 0.000

(PRM: Poisson Regression Model, NBRM: Negative Binomial Regression Model, ZIP: Zero-Inflated Poisson and ZINB: Zero-Inflated Negative Binomial)

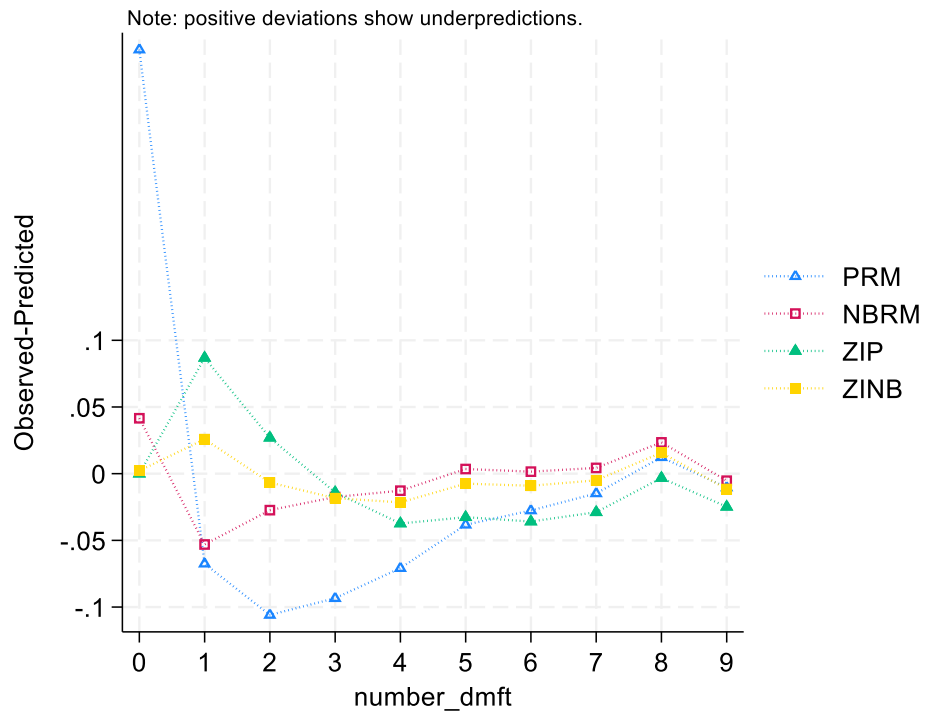


Figure 6.3 The STATA output indicates that ZINB was appropriate for analysing the associations between early-life behaviours and the severity of caries experience in Study 2

6.4. Results

6.4.1. Response to the survey

A total of 455 children were sampled across various schools, with participation in questionnaires and the oral examinations with 405 and 345 respectively (Table 6.7). In government schools, participation ranged from 9 children at Beribi Telanai to 33 at Jalan 49, with most children completing the oral exam except for a few instances of no consent, absenteeism, or refusal. In private schools, the number of children sampled varied from 6 at Nusa Laila to 76 at Stella, with generally high completion rates for the oral exam. Stella demonstrated the highest participation, with 60 completed questionnaires out of 76 sampled children and the highest oral exam completion rate of 52. Across all schools, 67 children did not consent, 35 were absent, six refused and 345 completed the oral exam. The overall response rate for this survey was 75.8%.

Table 6.7 Number of participants involved in the study

Name of school	No. of sampled child	Questionnaire completed	No consent	Absent	Refused oral exam	Completed oral exam
Government						
Delima Satu	10	10	0	0	0	10
Dato Othman	14	12	2	1	0	11
Jalan 49	33	29	4	3	2	24
Jalan 10	14	14	0	2	0	12
Rimba 3	27	24	4	1	0	22
Katok A	22	22	0	1	0	21
Beribi Telanai	9	5	4	1	0	4
Rimba 1	32	29	5	1	0	26
Private						
Abejess	12	10	2	3	1	6
Freda Radin	12	12	0	0	0	12
Yayasan	18	17	0	1	0	17
Jigsaw	32	28	4	7	0	21
Chung Hwa	47	45	8	0	1	38
Learning Tree	26	26	4	1	0	21
Nusa Laila	6	6	0	0	0	6
Tinkerbell	28	22	9	1	0	16
St. Andrew's	37	34	5	6	0	26
Stella	76	60	16	6	2	52
Total	455	405	67	35	6	345

6.4.2. Results from parental questionnaire

6.4.2.1. Sociodemographic characteristics

The sociodemographic characteristics presented from the parental questionnaire are shown in Table 6.8. The gender distribution shows most male participants at 56.8%, compared to 43.2% female. The predominant ethnicity among the children was Brunei Malay (82.4%), with Chinese and other ethnicities representing 10.7% and 5.1%, respectively. Regarding school type, more children attend private schools (62.3%) than government schools (37.7%). Parental education appears varied, with 31.4% having secondary education or below, an equal percentage having vocational or A level and HND and a slightly higher 37.2% possessing a bachelor's degree or above. Household income data shows a spread across different economic strata, with 18.2% earning below B\$2,000 per month, 41.4% between B\$2,000 to B\$2,999 and 40.4% earning B\$3,000 and above.

Table 6.8 Sociodemographic characteristics of the samples (n = 345)

Variable	No. of children (Missing data)	% Valid (% Missing)
Sex (n = 345)		
Male	196	56.8
Female	149	43.2
Child ethnicity (n = 335)		
Brunei Malay	282	84.2
Chinese	36	10.7
Other	17 (10)	5.1 (2.9)
School type (n = 345)		
Government	130	37.7
Private	215	62.3
Highest education of one parent (n = 331)		
Secondary or below	104	31.4
Vocational, A level and HND	104	31.4
Bachelor's degree or above	123 (14)	37.2 (4.1)
Household income* (n = 319)		
Low income	58	18.2
Medium income	132	41.4
High income	129 (26)	40.4 (7.5)

*Household income received per month – Low: less than B\$2,000 (or equivalent to less than € 1,414), medium: B\$2,000 to 2,999 (or €1,414 to €2120), high: B\$3,000 and above (or €2,121 and above)

6.4.2.2. Child's early-life behaviours

Table 6.9 summarises data on the dental care routines and practices established in early childhood of the study participants. The data shows that a proportion of children start brushing at 6 to 12 months (39.9%) and by 24 months and above, 27.0% of children begin brushing. Notably, 80.5% of children brush their teeth twice or more daily at age 2 to 3, with parental supervision in brushing being very high at 86.8%. Regarding breastfeeding, half of the children (50.6%) stopped breastfeeding at 24 months or more. Additionally, 50.0% of the children had their first dental visit at 12 months and above, while 22.9% never visit the dentist. This table provides valuable insights into the oral care routines established in early childhood, which can have lasting impacts on dental health.

Table 6.9 Children's early-life behaviours concerning dental hygiene and practices

Variable	No. of children (Missing data)	% Valid (% Missing)
Age start brushing (n = 330)		
Six months and below	53	15.9
6 to 12 months	133	39.9
12 to 24 months	57	17.1
24 months and above	90	27.0
	(12)	(3.5)
Frequency of brushing per day at ages 2-3 (n = 320)		
Less than twice	64	19.5
Twice and more	256	80.5
	(16)	(4.6)
Toothbrushing supervision at ages 2-3 (n = 325)		
No supervision	43	13.2
Parental supervision	282	86.8
	(20)	(5.8)
Age of stopping breastfeeding (n = 326)		
24 months or more	165	50.6
Between 12 and 24 months	54	16.6
12 months and below	107	32.8
	19	(5.5)
Age of first dental visit (n = 332)		
Below 12 months	90	27.1
12 months and above	166	50.0
Never visit	76	22.9
	(13)	(3.8)

6.4.2.3. Child's current oral health behaviours

Most children (89.6%) brushed their teeth twice or more daily, with 52.3% received adult assistance in brushing their teeth. Most children used fluoridated adult toothpaste (95.4%), with most using a pea-sized amount (71.3%). After brushing, 83.1% of children either swallowed or rinsed and spat. 41.2% of children consumed sugary foods four times or more daily and 10.4% consumed sugary drinks at the same number of daily intakes. Dental attendance in the last two years was evenly split, with 47.4% having visited and 52.6% not doing so (Table 6.10).

Table 6.10 Current oral life behaviours among study children

Variable	No. of children (Missing data)	% Valid (% Missing)
Frequency of brushing per day at present (n = 328)		
Less than twice	34	10.4
Twice and more	294 (17)	89.6 (4.9)
Toothbrushing supervision at present (n = 327)		
No supervision	156	47.7
Parental supervision	171 (18)	52.3 (5.2)
Type of toothpaste used (n = 326)		
Fluoridated adult	314	95.4
Fluoridated child	8	2.4
Non-fluoridated	7 (16)	2.1 (4.6)
Amount of toothpaste used (n = 338)		
Full length of brush head	64	18.9
Pea size	241	71.3
Smear layer	33 (7)	9.8 (2.0)
Habit after brushing (n = 338)		
Swallow or rinse and spit	281	83.1
Just spit	57 (7)	16.9 (2.0)
Frequency of sugary food intake per day (n = 337)		
Once or less	99	29.4
Two or three times	99	29.4
Four times or more	139 (8)	41.2 (2.3)
Frequency of sugary drink intake per day (n = 336)		
Once or less	230	68.5
Two or three times	71	21.1
Four times or more	35 (9)	10.4 (2.6)
Dental attendance in the last two years (n = 323)		
Had visited	153	47.4
No visit	170 (22)	52.6 (6.4)

6.4.3. Outcome data

6.4.3.1. Prevalence of children with caries experience by sociodemographic characteristics

Table 6.11 shows the prevalence of caries experience among 5-year-old children based on various sociodemographic characteristics. Overall, 59.4% (95% CI: 54.0 to 64.6%) of children in the study had experienced caries. The prevalence of caries experience was higher in females (60.4%; 95% CI: 53.7 to 67.1%) compared to males, though this **difference was not significant** ($p = 0.746$). Ethnically, Brunei Malay children had the highest prevalence of caries experience (61.3%; 95% CI: 54.5 to 68.1%), while children categorised as 'Other' ethnicities showed the lowest prevalence; however, this **difference was not significant** ($p = 0.746$). A **significant difference** was observed across school type, parental education and household income categories ($p < 0.05$). Children attending government schools (72.3%; 95% CI: 66.2 to 78.4%), those with the lowest parental education (76.0%; 95% CI: 70.1 to 81.9%), and those from low-income households (71.4%; 95% CI: 65.0 to 77.8%) had the highest prevalence of caries experience within their respective categories.

Table 6.11 Prevalence of children with dmft > 0 by sociodemographic characteristics

Variable	n	Prevalence (%) of dmft > 0 (95% CI)	Chi-sq	p-value
All children	345	59.4 (54.0, 64.6)	-	-
Sex				
Male	115	58.7 (52.0, 65.4)	0.105	0.746
Female	90	60.4 (53.7, 67.1)		
Child ethnicity				
Brunei Malay	173	61.3 (54.5, 68.1)	3.439	0.179
Chinese	19	52.8 (45.9, 59.7)		
Other	7	41.2 (34.4, 48.0)		
School type				
Government	94	72.3 (66.2, 78.4)	14.369	<0.001
Private	111	51.6 (44.8, 58.4)		
Highest education of one parent				
Secondary or below	79	76.0 (70.1, 81.9)	17.923	<0.001
Vocational, A level and HND	59	56.7 (49.8, 63.6)		
Bachelor's degree or above	60	48.8 (41.8, 55.8)		
Household income per month*				
Low income	90	71.4 (65.0, 77.8)	12.769	0.002
Medium income	37	57.8 (50.8, 64.8)		
High income	64	49.6 (42.5, 56.7)		

*Household income received per month – Low: less than B\$2,000 (or equivalent to less than € 1,414), medium: B\$2,000 to 2,999 (or €1,414 to €2120), high: B\$3,000 and above (or €2,121 and above)

6.4.3.2. Prevalence of children with caries experience by child's early-life behaviours

The prevalence of caries experience in children based on their early-life behaviours is illustrated in Table 6.12. Children who started brushing their teeth between 12 to 24 months depicted the highest prevalence of caries experience (66.7%; 95% CI: 60.1 to 73.3%), with a **significant difference** ($p = 0.015$). Those brushing less than twice a day at ages 2 to 3 showed a higher prevalence of caries experience (62.5%; 95% CI: 55.7 to 69.3%) compared to those brushing twice or more, but this **difference was not significant** ($p = 0.454$). The prevalence of caries experience was higher in children brushing their own teeth (79.1%; 95% CI: 73.3 to 84.9%) compared to those with adult supervision, with a **significant difference** ($p = 0.003$). Children who stopped breastfeeding at 12 months or earlier had the highest caries prevalence (64.5%; 95% CI: 57.7 to 71.3%), with **no significant difference** ($p = 0.137$). Lastly, children who had their first dental visit before the age of 12 months exhibited the highest prevalence of caries experience (67.8%; 95% CI: 61.3 to 74.3%) within the 'age of first dental visit' category, but **the difference was not significant** ($p = 0.121$).

Table 6.12 Prevalence of children with dmft > 0 by early-life behavioural characteristics

Variable/ Category	n	Prevalence (%) of dmft > 0 (95% CI)	Chi-sq	p-value
Age start brushing				
6 months and below	21	39.6 (32.8, 46.4)	10.518	0.015
6 to 12 months	81	60.9 (54.1, 67.7)		
12 to 24 months	38	66.7 (60.1, 73.3)		
24 months and above	57	63.3 (56.6, 70.0)		
Frequency of brushing per day at ages 2-3				
Less than twice	40	62.5 (55.7, 69.3)	0.561	0.454
Twice and more	152	57.4 (50.4, 64.4)		
Toothbrushing supervision at ages 2-3				
No supervision	34	79.1 (73.3, 84.9)	8.667	0.003
Parental supervision	156	55.3 (48.2, 62.4)		
Age of stopping breastfeeding				
24 months or more	98	59.4 (52.5, 66.3)	3.971	0.137
Between 12 and 24 months	26	48.2 (41.2, 55.2)		
12 months and below	69	64.5 (57.7, 71.3)		
Age of first dental visit				
Below 12 months (ref)	61	67.8 (61.3, 74.3)	4.230	0.121
12 months and above	96	57.8 (50.9, 64.7)		
Never visit	40	52.6 (45.6, 59.6)		

6.4.3.3. Prevalence of children with caries experience by child's current oral health behaviours

Children who brushed their teeth twice daily exhibited a higher prevalence of caries experience (56.5%; 95% CI: 49.5 to 63.5%) than those who brushed less frequently (Table 6.13), with a **significant difference** ($p = 0.004$). Children who brushed alone without parental supervision had a higher prevalence of caries experience (63.5%; 95% CI: 56.7 to 70.3%) than those who brushed with parental supervision; however, this **difference was not significant** ($p = 0.146$). Children using non-fluoridated toothpaste had the highest prevalence (71.4%; 95% CI: 65.0 to 77.8%) within the toothpaste type category, though this **difference was not significant** ($p = 0.764$). Meanwhile, children using toothpaste covering the full length of the brush head had the highest prevalence of experiencing caries (71.9%; 95% CI: 65.7 to 78.1%) in their group, and the **difference was significant** ($p = 0.029$). After brushing, those who swallowed, rinsed, and spat had a higher prevalence of caries experience (59.8%; 95% CI: 53.0 to 66.6%) compared to those who just spat, but the **difference was not significant** ($p = 0.610$).

Children who consumed sugary foods four times or more per day had the highest prevalence of experiencing caries (64.0%; 95% CI: 57.3 to 70.7%) within their category, though the difference was not significant ($p = 0.252$). Conversely, those who consumed sugary beverages four or more times daily (77.1%; 95% CI: 71.3 to 82.9%) exhibited the highest prevalence within their category, with a significant difference ($p = 0.019$). Children who had visited a dentist in the last two years had a slightly higher prevalence of caries experience (5.75; 95% CI: 4.88 to 6.62) compared to those who had never visited. However, the difference was not significant ($p = 0.895$).

Table 6.13 Prevalence of children with *dmft* > 0 by current oral health behavioural characteristics

Variable/ Category	n	Prevalence (%) of dmft > 0 (95% CI)	Chi-sq	p-value
Frequency of brushing per day at present				
Less than twice	28	43.5 (35.6, 50.5)	8.454	0.004
Twice and more	166	56.5 (49.5, 63.5)		
Toothbrushing supervision at present				
No supervision	99	63.5 (56.7, 70.3)	2.113	0.146
Parental supervision	95	55.6 (48.6, 62.6)		
Type of toothpaste used				
Fluoridated adult	183	58.3 (51.3, 65.3)	0.538	0.764
Fluoridated child	5	62.5 (55.7, 69.3)		
Non-fluoridated	5	71.4 (65.0, 77.8)		
Amount of toothpaste used				
Full length of brush head	46	71.9 (65.7, 78.1)	7.069	0.029
Pea size	139	57.7 (50.9, 64.5)		
Smear layer	15	45.5 (38.6, 52.4)		
Habit after brushing				
Swallow or rinse and spit	168	59.8 (53.0, 66.6)	0.261	0.610
Just spit	32	56.1 (49.2, 63.0)		
Frequency of sugary food intake per day				
Once or less per day	57	57.6 (50.7, 64.5)	2.759	0.252
Two or three times	53	53.5 (46.6, 60.4)		
Four times or more	89	64.0 (57.3, 70.7)		
Frequency of sugary drink intake per day				
Once or less per day	126	54.8 (47.9, 61.7)	7.968	0.019
Two or three times	47	66.2 (59.6, 72.8)		
Four times or more	27	77.1 (71.3, 82.9)		
Dental attendance in the last two years				
Had visited	92	60.1 (53.2, 67.0)	0.0017	0.895
No visit	101	59.4 (52.5, 66.3)		

6.4.3.4. Severity of caries experience by sociodemographic characteristics

Table 6.14 shows that the mean dmft for all children was 3.63 (95% CI: 3.13 to 4.13). Males had a higher mean dmft (3.73; 95% CI: 3.05 to 4.42) compared to females, though the **difference was not significant** ($p = 0.876$). Among ethnic groups, Brunei Malay children had the highest mean dmft (3.88; 95% CI: 3.31 to 4.44), while Chinese children had the lowest mean dmft (1.94; 95% CI: 0.87 to 3.02), with this **difference being significant** ($p = 0.044$). Government school children had a higher mean dmft (5.44; 95% CI: 4.48 to 6.40) compared to private school children, with a **significant difference** ($p < 0.001$). Children with parents who had secondary education or below (5.76; 95% CI: 4.68 to 6.84) and those from low-income families (5.30; 95% CI: 4.35 to 6.25) had the highest mean dmft within their respective categories. The groups within these categories showed **significant differences** ($p < 0.05$).

Table 6.14 Severity of caries experience among children by sociodemographic characteristics

Variable/ Category	n	Mean of dmft (95% CI)	(Q1, Med, Q3) of dmft	**M-W Z/ K-W Chi- sq	p-value
All children	345	3.63 (3.13, 4.13)	(0, 1, 6)	-	-
Sex					
Male	196	3.73 (3.05, 4.42)	(0, 1, 6)		
Female	149	3.50 (2.76, 4.24)	(0, 1, 6)	0.156	0.876
Child ethnicity					
Brunei Malay	282	3.88 (3.31, 4.44)	(0, 2, 7)		
Chinese	36	1.94 (0.87, 3.02)	(0, 1, 3)		
Other	17	2.18 (0.20, 4.15)	(0, 0, 3)	6.267	0.044
School type					
Government	130	5.44 (4.48, 6.40)	(0, 4, 10)		
Private	215	2.54 (2.03, 3.04)	(0, 1, 4)	5.120	<0.001
Highest education of one parent					
Secondary or below	104	5.76 (4.68, 6.84)	(1, 4, 11)		
Vocational, A level and HND	104	3.37 (2.52, 4.21)	(0, 1, 6)		
Bachelor's degree or above	123	2.09 (1.49, 2.69)	(0, 0, 3)	31.004	<0.001
Household income per month*					
Low income	126	5.30 (4.35, 6.25)	(0, 4, 10)		
Medium income	64	2.49 (1.66, 3.31)	(0, 1, 4)		
High income	129	2.48 (1.80, 3.16)	(0, 0, 3)	23.696	<0.001

*Household income received per month – Low: less than B\$2,000 (or equivalent to less than € 1,414), medium: B\$2,000 to 2,999 (or €1,414 to €2120), high: B\$3,000 and above (or €2,121 and above). **M-W Z: Mann-Whitney Z; K-W: Kruskal Willis

6.4.3.5. Severity of caries experience by child's early-life behaviours

Table 6.15 shows that children who began brushing their teeth between 12 and 24 months had the highest mean dmft (2.04; 95% CI: 0.98 to 3.09) within the category 'age of start brushing' with a **significant difference** ($p = 0.009$). Children who brushed less than twice per day at age 2 to 3 had a higher mean dmft (4.41; 95% CI: 3.07 to 5.74) than those who brushed twice or more daily, with a **non-significant difference** ($p = 0.235$). When children brushed their own teeth at age 2 to 3, the mean dmft was 5.26 (95% CI: 3.59 to 6.93), compared to those with adult supervision, and this **difference was significant** ($p = 0.004$). Regarding the age of stopping breastfeeding, children who stopped at 12 months and below had the highest mean dmft (4.18; 95% CI: 3.22 to 5.13), with a **non-significant difference** ($p = 0.108$). Lastly, the age of the first dental visit showed a **significant difference** ($p = 0.007$), with children who visited a dentist at 12 months and below having the highest mean dmft (4.53; 95% CI: 3.48 to 5.59).

Table 6.15 Severity of caries experience among children by early-life behavioural characteristics

Variable/ Category	n	Mean of dmft (95% CI)	(Q1, Med, Q3) of dmft	**M-W Z/ K-W Chi-sq	p-value
Age of start brushing					
6 months and below	53	2.04 (0.98, 3.09)	(0, 0, 2)		
6 to 12 months	113	3.66 (2.85, 4.48)	(0, 1, 6)		
12 to 24 months	57	4.33 (3.05, 5.61)	(0, 3, 7)		
24 months and above	90	3.84 (2.86, 4.83)	(0, 2, 7)	11.473	0.009
Frequency of brushing per day at ages 2-3					
Less than twice	64	4.41 (3.07, 5.74)	(0, 1, 9)		
Twice and more	265	3.31 (2.78, 3.84)	(0, 1, 5)	1.187	0.235
Toothbrushing supervision at ages 2-3					
No supervision	43	5.26 (3.59, 6.93)	(1, 3, 10)		
Parental supervision	282	3.27 (2.75, 3.79)	(0, 1, 6)	2.856	0.004
Age of stopping breastfeeding					
24 months or more	165	3.59 (2.87, 4.32)	(0, 1, 6)		
Between 12 and 24 months	54	2.74 (1.58, 3.90)	(0, 5, 8)		
12 months and below	107	4.18 (3.22, 5.13)	(0, 2, 7)	4.449	0.108
Age of first dental visit					
Below 12 months	90	4.53 (3.48, 5.59)	(0, 3, 8)		
12 months and above	166	3.76 (3.01, 4.51)	(0, 1, 6)		
Never visit	76	2.05 (1.32, 2.79)	(0, 1, 3)	9.982	0.007

** M-W Z: Mann-Whitney Z; K-W: Kruskal Willis

6.4.3.6. Severity of caries experience by child's current oral health behaviours

Children who brushed less than twice daily had a higher mean dmft (5.56; 95% CI: 3.72 to 7.40) compared to those who brushed twice or more. This **difference was significant** ($p = 0.004$) (Table 6.16). Children who brushed on their own (4.03; 95% CI: 3.26 to 4.81) and those using fluoridated adult toothpaste (3.65; 95% CI: 3.12 to 4.18) had higher mean dmft scores than their counterparts, although these **differences were not significant** ($p > 0.05$). Regarding the amount of toothpaste used, children who used a full length of the brush head had the highest mean dmft (4.77; 95% CI: 3.47 to 6.06), with a **significant difference** ($p = 0.024$).

With respect to the frequency of sugary food intake per day, children who consumed sugary foods four times or more had a mean dmft of 3.99 (95% CI: 3.16 to 4.82). This **difference was not significant** ($p = 0.317$). Meanwhile, children who consumed sugary beverages four or more times daily showed the highest mean dmft within this category (5.40; 95% CI: 3.60 to 7.20), and the **difference was significant** ($p = 0.003$). Children who had visited a dentist in the last two years had a higher mean dmft (3.99; 95% CI: 3.20 to 4.77) compared to those who had never visited a dentist. However, the **difference was not significant** ($p = 0.442$).

Table 6.16 Severity of caries experience among children by current oral health behavioural characteristics

Variable/ Category	n	Mean of dmft (95% CI)	(Q1, Med, Q3) of dmft	M-W Z/ K-W Chi- sq	p-value
Frequency of brushing per day at present					
Less than twice	34	5.56 (3.72, 7.40)	(1, 3, 10)		
Twice and more	294	3.43 (2.90, 3.95)	(0, 1, 6)	2.917	0.004
Toothbrushing supervision at present					
No supervision	156	4.03 (3.26, 4.81)	(0, 2, 7)		
Parental supervision	171	3.27 (2.59, 3.95)	(0, 1, 5)	1.609	0.108
Type of toothpaste used					
Fluoridated adult	314	3.65 (3.12, 4.18)	(0, 1, 6)		
Fluoridated child	8	3.25 (0.00, 7.48)	(0, 2, 4)		
Non fluoridated	7	2.14 (0.00, 4.31)	(0, 2, 2)	0.013	0.993
Amount of toothpaste used					
Full length of brush head	64	4.77 (3.47, 6.06)	(0, 4, 8)		
Pea size	241	3.46 (2.88, 4.05)	(1, 6, 11)		
Smear layer	33	2.52 (1.07, 3.96)	(0, 0, 3)	0.032	0.024
Habit after brushing					
Swallow, rinse and spit	281	3.69 (3.14, 4.25)	(0, 1, 6)		
Just spit	57	3.25 (2.05, 4.45)	(0, 1, 5)	0.624	0.532
Frequency of sugary food intake per day					
Once or less per day	99	3.42 (2.51, 4.34)	(0, 1, 6)		
Two or three times	99	3.20 (2.33, 4.07)	(0, 1, 6)		
Four times or more	139	3.99 (3.16, 4.82)	(0, 2, 7)	2.296	0.317
Frequency of sugary drink intake per day					
Once or less per day	230	3.06 (2.50, 3.62)	(0, 1, 5)		
Two or three times	71	4.54 (3.30, 5.77)	(0, 2, 8)		
Four times or more	35	5.40 (3.60, 7.20)	(1, 4, 9)	11.560	0.003
Dental attendance in the last two years					
Had visited	153	3.99 (3.20, 4.77)	(0, 2, 7)		
No visit	170	3.45 (2.76, 4.15)	(0, 1, 5)	0.769	0.442

6.4.4. Logistic regression analysis

6.4.4.1. Analysis of each early-life behaviour with the prevalence of dmft > 0 in children, then sequentially adjusting for sociodemographic variables

The logistic regression analysis in Table 6.17 examines the associations between **each** early-life oral health behaviour and the prevalence of caries experience in children. The analysis spans five models, sequentially adjusting for different sociodemographic variables. A consistent finding across all models was the **significant positive associations** between the age of starting to brush teeth and the prevalence of caries experience. In the fully adjusted model, children who started brushing at the ages of 6 to 12 months (OR: 2.67; 95% CI: 1.31 to 5.45; $p = 0.007$), 12 to 24 months (OR: 3.72; 95% CI: 1.56 to 8.90; $p = 0.003$), and 24 months and above (OR: 2.55; 95% CI: 1.18 to 5.51; $p = 0.017$) had **significantly increased the odds of having caries experience** compared to those who started brushing before the age of 6 months. Parental supervision in toothbrushing at age 2 to 3 consistently showed **significant negative associations** (protective effect) with the prevalence of caries experience across all models. In model 5, children with parental supervision during brushing **significantly reduced the odds of having caries experience** (OR: 0.24; 95% CI: 0.09 to 0.63; $p = 0.004$) compared to those who brushed without parental supervision.

The age of stopping breastfeeding showed a **significant negative association** with the prevalence of caries experience only in model 5. In this fully adjusted model, children who stopped breastfeeding between the ages of 12 and 24 months **significantly reduced the odds of experiencing caries** (OR: 0.49; 95% CI: 0.24 to 0.99; $p = 0.046$) compared to those who breastfed later than 24 months. Meanwhile, the age of first dental visit was only **significantly negatively associated** with the prevalence of caries experience in the unadjusted model, with children who never visit dentists **significantly reduced the odds of experiencing caries** (OR: 0.53; 95% CI: 0.28 to 0.99) compared to the reference group. From models 1 to 5, only the frequency of daily brushing **did not show any significant association** ($p > 0.05$) with the prevalence of caries experience.

Table 6.17 Logistic regression model to assess the associations of each early-life behaviour with prevalence of children with dmft > 0 and then adjusting for sex, ethnicity, school type, parental education and household income sequentially

OR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Age of start brushing (n = 310)						
6 months and below (ref)						
6 to 12 months	2.37 (1.24, 4.55), p=0.009	2.52 (1.29, 4.94), p=0.007	2.51 (1.27, 4.96), p=0.008	2.65 (1.32, 5.28), p=0.006	2.56 (1.27, 5.17), p=0.009	2.67 (1.31, 5.45) p=0.007
12 to 24 months	3.05 (1.40, 6.64), p=0.005	3.49 (1.57, 7.79), p=0.002	3.41 (1.51, 7.68), p=0.003	3.47 (1.51, 7.98), p=0.003	3.66 (1.55, 8.67), p=0.003	3.72 (1.56, 8.90) p=0.003
24 months and above	2.63 (1.31, 5.29), p=0.007	3.01 (1.46, 6.21), p=0.003	2.64 (1.26, 5.51), p=0.010	2.70 (1.28, 5.71), p=0.009	2.52 (1.18, 5.40), p=0.017	2.55 (1.18, 5.51) p=0.017
Frequency of brushing per day at ages 2-3 (n = 307)						
Less than twice (ref)						
Twice and more	0.81 (0.46, 1.42), p=0.454	0.73 (0.41, 1.31), p=0.292	0.64 (0.36, 1.16), p=0.141	0.60 (0.33, 1.10), p=0.102	0.65 (0.36, 1.21), p=0.175	0.63 (0.34, 1.18) p=0.148
Toothbrushing supervision at ages 2-3 (n = 303)						
No supervision (ref)						
Parental supervision	0.33 (0.15, 0.71), p=0.005	0.27 (0.12, 0.61), p=0.002	0.28 (0.12, 0.64), p=0.003	0.27 (0.11, 0.66), p=0.004	0.23 (0.09, 0.61), p=0.003	0.24 (0.09, 0.63) p=0.004
Age of stopping breastfeeding (n = 298)						
24 months or more (ref)						
Between 12 and 24 months	0.63 (0.34, 1.18), p=0.149	0.61 (0.33, 1.16), p=0.132	0.63 (0.33, 1.21), p=0.165	0.56 (0.29, 1.10), p=0.092	0.53 (0.27, 1.04), p=0.066	0.49 (0.24, 0.99), p=0.046
12 months and below	1.24 (0.75, 2.05), p=0.400	1.16 (0.70, 1.95), p=0.562	1.17 (0.69, 1.99), p=0.551	1.19 (0.69, 2.04), p=0.533	1.06 (0.61, 1.84), p=0.834	1.09 (0.62, 1.90), p=0.756
Age of first dental visit (n = 312)						
Below 12 months (ref)						
12 months and above	0.65 (0.38, 1.12), p=0.120	0.66 (0.38, 1.14), p=0.134	0.70 (0.40, 1.21), p=0.200	0.76 (0.43, 1.34), p=0.338	0.79 (0.45, 1.41), p=0.427	0.79 (0.44, 1.41), p=0.429
Never visit	0.53 (0.28, 0.99), p=0.047	0.57 (0.30, 1.09), p=0.088	0.56 (0.29, 1.07), p=0.079	0.56 (0.29, 1.10), p=0.090	0.60 (0.30, 1.19), p=0.146	0.58 (0.29, 1.16), p=0.123

Model 1: unadjusted; Model 2: adjusted for sex and ethnicity; Model 3: adjusted for sex, ethnicity and school type; Model 4a: adjusted for sex, ethnicity, school type and parental education; Model 4b: adjusted for sex, ethnicity, school type and household income; Model 5: Fully adjusted

6.4.4.2. Analysis of all combined early-life behaviours with the prevalence of dmft > 0 in children, then sequentially adjusting for sociodemographic variables

The logistic regression analysis presented in Table 6.18 examines the associations between **all combined** early-life oral health behaviours and the prevalence of caries experience in children when they were 2 to 3 years old. In this regression analysis, all models 1 to 5 accounted or adjusted for all early-life behaviours. In models 1 to 5, there were consistent **significant positive associations** between the age of starting to brush teeth and the prevalence of caries experience. In the fully adjusted model, children who started brushing at the ages of 6 to 12 months (OR: 2.69; 95% CI: 1.23 to 5.90; $p = 0.013$), 12 to 24 months (OR: 3.77; 95% CI: 1.46 to 9.75; $p = 0.006$) and 24 months and above (OR: 2.34; 95% CI: 1.01 to 5.51; $p = 0.049$) **significantly increased the odds of having caries experience** compared to those who started brushing before the age of 6 months. Toothbrushing supervision at ages 2 to 3 had consistent **significant negative associations** with the prevalence of caries experience for all models. In the fully adjusted model, children who were supervised with their brushings **significantly reduced the odds of experiencing caries** (OR: 0.29; 95% CI: 0.10 to 0.84; $p = 0.002$) in comparison to those who were not supervised.

A **significant negative association** between age of stopping breastfeeding and prevalence of caries experience was only found in model 5, with children who stopped breastfeeding between 12 and 24 months **significantly reduced the odds of experiencing caries** (OR: 0.47; 95% CI: 0.22 to 0.99; $p = 0.048$) compared to those who started breastfeeding after 24 months of age. Lastly, the age of first dental visit also had **significant negative associations** with the prevalence of caries experience in all models, except for model 4b. In the fully adjusted model, children who never visited dentists **significantly reduced the odds of having caries experience** compared to those who visited dentists below 12 months of age. Again, across all models, only the frequency of daily brushing **did not show any significant association** ($p > 0.05$) with the prevalence of caries experience.

Table 6.18 Logistic regression model to assess the associations of all combined early-life behaviours at once with prevalence of children with dmft > 0 and then adjusting for sex, ethnicity, school type, parental education and household income sequentially

OR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Age of start brushing						
6 months and below (ref)						
6 to 12 months	2.44 (1.19, 4.97), p=0.014	2.47 (1.19, 5.13), p=0.015	2.49 (1.19, 5.21), p=0.015	2.66 (1.25, 5.67), p=0.011	2.59 (1.21, 5.58), p=0.015	2.69 (1.23, 5.90), p=0.013
12 to 24 months	3.21 (1.37, 7.50), p=0.007	3.32 (1.41, 7.85), p=0.006	3.20 (1.35, 7.62), p=0.009	3.46 (1.40, 8.53), p=0.007	3.49 (1.39, 8.77), p=0.008	3.77 (1.46, 9.75), p=0.006
24 months and above	2.72 (1.24, 6.00), p=0.013	2.86 (1.28, 6.39), p=0.011	2.51 (1.11, 5.67), p=0.027	2.59 (1.12, 6.00), p=0.026	2.35 (1.01, 5.49), p=0.048	2.34 (1.01, 5.59), p=0.049
Frequency of brushing per day at ages 2-3						
Less than twice (ref)						
Twice and more	0.73 (0.38, 1.39), p=0.330	0.72 (0.37, 1.38), p=0.318	0.64 (0.33, 1.23), p=0.179	0.58 (0.29, 1.15), p=0.117	0.63 (0.32, 1.27), p=0.196	0.60 (0.30, 1.21), p=0.152
Toothbrushing supervision at ages 2-3						
No supervision (ref)						
Adult supervision	0.33 (0.14, 0.77), p=0.011	0.33 (0.14, 0.79), p=0.013	0.34 (0.14, 0.82), p=0.017	0.34 (0.13, 0.90), p=0.030	0.28 (0.10, 0.78), p=0.015	0.29 (0.10, 0.84), p=0.022
Age of stopping breastfeeding						
24 months or more (ref)						
Between 12 and 24 months	0.53 (0.27, 1.04), p=0.065	0.54 (0.27, 1.05), p=0.071	0.56 (0.28, 1.11), p=0.095	0.50 (0.24, 1.02), p=0.057	0.51 (0.25, 1.05), p=0.067	0.47 (0.22, 0.99), p=0.048
12 months and below	1.06 (0.60, 1.88), p=0.832	1.01 (0.57, 1.80), p=0.966	1.01 (0.56, 1.81), p=0.967	1.11 (0.61, 2.02), p=0.728	1.01 (0.55, 1.86), p=0.965	1.07 (0.58, 1.97), p=0.839
Age of first dental visit						
Below 12 months (ref)						
12 months and above	0.52 (0.28, 0.94), p=0.029	0.52 (0.29, 0.95), p=0.035	0.56 (0.31, 1.04), p=0.065	0.56 (0.30, 1.07), p=0.077	0.67 (0.36, 1.27), p=0.219	0.61 (0.32, 1.18), p=0.140
Never visit	0.44 (0.21, 0.91), p=0.026	0.46 (0.22, 0.96), p=0.038	0.47 (0.22, 0.98), p=0.044	0.42 (0.19, 0.91), p=0.028	0.50 (0.23, 1.09), p=0.082	0.45 (0.20, 1.01), p=0.049

Model 1: unadjusted; Model 2: adjusted for sex and ethnicity; Model 3: adjusted for sex, ethnicity and school type; Model 4a: adjusted for sex, ethnicity, school type and parental education; Model 4b: adjusted for sex, ethnicity, school type and household income; Model 5: Fully adjusted

6.4.4.3. Analysis of each current oral health behaviour with the prevalence of dmft > 0 in children, then sequentially adjusting for sociodemographic variables

The logistic regression analysis in Table 6.19 examines the associations between **each** current oral health behaviour and the prevalence of caries experience in children. Across all models, there were **significant negative associations** between the frequency of toothbrushing at age 5 and prevalence of caries experience. In the fully adjusted model, children who brushed twice or more per day at age 5 **significantly reduced the odds of having caries experience** (OR: 0.24; 95% CI: 0.09 to 0.65; $p = 0.005$) compared to those who brushed once or less per day. Despite the **significant positive associations** between the frequency of sugary drinks per day and the prevalence of caries experience in models 1 to 4a, this association was no longer significant ($p > 0.05$) when all sociodemographic characteristics were accounted for in model 5. Lastly, in models 1 to 5, the prevalence of caries experience **did not show any significant associations** ($p > 0.05$) with toothbrushing supervision, the type of toothpaste used, the frequency of daily sugary food intake or dental attendance in the past two years.

Table 6.19 Logistic regression model to assess the associations of each current oral health behaviour with prevalence of children with dmft > 0 and then adjusting for sex, ethnicity, school type, parental education and household income sequentially

OR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Frequency of brushing per day at present (n = 308)						
Less than twice (ref)						
Twice and more	0.28 (0.11, 0.69), p=0.006	0.24 (0.09, 0.61), p=0.003	0.24 (0.09, 0.62), p=0.003	0.24 (0.09, 0.64), p=0.004	0.25 (0.09, 0.66), p=0.005	0.24 (0.09, 0.65), p = 0.005
Toothbrushing supervision at present (n = 308)						
No supervision (ref)						
Parental supervision	0.72 (0.46, 1.12), p=0.147	0.67 (0.43, 1.06), p=0.086	0.70 (0.44, 1.11), p=0.130	0.69 (0.43, 1.10), p=0.120	0.65 (0.40, 1.05), p=0.081	0.67 (0.41, 1.09), p=0.106
Type of toothpaste used						
Adult fluoridated (ref)						
Child fluoridated	1.19 (0.28, 5.08), p=0.811	1.32 (0.30, 5.83), p=0.715	1.52 (0.34, 6.77), p=0.581	1.51 (0.33, 6.88), p=0.597	2.33 (0.42, 12.83), p=0.333	2.47 (0.44, 13.93), p=0.305
Non-fluoridated	1.79 (0.34, 9.37), p=0.491	3.48 (0.39, 30.71), p=0.262	4.14 (0.47, 36.84), p=0.202	4.58 (0.51, 41.31), p=0.175	4.03 (0.45, 35.79), p=0.212	4.32 (0.48, 38.99), p=0.192
Frequency of sugary food intake per day (n = 314)						
Once or less (ref)						
Two or three times	0.85 (0.48, 1.49), p=0.567	0.81 (0.46, 1.43), p=0.461	0.82 (0.46, 1.47), p=0.502	0.78 (0.43, 1.42), p=0.421	0.80 (0.44, 1.46), p=0.471	0.77 (0.42, 1.41) p = 0.393
Four times or more	1.31 (0.77, 2.22), p=0.314	1.28 (0.75, 2.19), p=0.373	1.37 (0.79, 2.37), p=0.262	1.44 (0.82, 2.52), p=0.206	1.50 (0.84, 2.67), p=0.174	1.50 (0.83, 2.69) p = 0.179
Frequency of sugary drink intake per day (n = 316)						
Once or less (ref)						
Two or three times	1.62 (0.93, 2.82), p=0.091	1.66 (0.94, 2.90), p=0.078	1.52 (0.86, 2.68), p=0.154	1.52 (0.86, 2.68), p=0.154	1.48 (0.82, 2.65), p=0.194	1.54 (0.84, 2.82) p = 0.164
Four times or more	2.79 (1.21, 6.39), p=0.016	2.74 (1.19, 6.33), p=0.018	2.53 (1.08, 5.92), p=0.032	2.53 (1.08, 5.92), p=0.032	2.11 (0.89, 5.02), p=0.090	2.37 (0.95, 5.94) p = 0.065
Dental attendance in the last two years (n = 304)						
Had visited						
No visit	0.97 (0.62, 1.52), p=0.895	0.98 (0.62, 1.53), p=0.919	0.91 (0.57, 1.43), p=0.674	0.84 (0.53, 1.35), p=0.483	0.84 (0.52, 1.36), p=0.471	0.82 (0.50, 1.34), p=0.430

Model 1: unadjusted; Model 2: adjusted for sex and ethnicity; Model 3: adjusted for sex, ethnicity and school type; Model 4a: adjusted for sex, ethnicity, school type and parental education; Model 4b: adjusted for sex, ethnicity, school type and household income; Model 5: Fully adjusted

6.4.4.4. Analysis of all combined current oral health behaviours at once with the prevalence of dmft > 0 in children, then sequentially adjusting for sociodemographic variables

The logistic regression analysis presented in Table 6.20 demonstrates the associations of **all combined** current oral health behaviours with the prevalence of children with caries experience. From models 1 to 5, the frequency of toothbrushing at age 5 was **significantly positively associated** with the prevalence of caries experience. In model 5, children who brushed twice or more per day at age 5 **significantly reduced the odds of having caries experience** (OR: 0.26; 95% CI: 0.09 to 0.76; $p = 0.014$) compared to those who brushed once or less per day. Despite the **significant positive associations** between the frequency of sugary drinks per day and the prevalence of caries experience in models 1 and 2, these associations were no longer significant from models 3 onwards.

Again, across all models, the prevalence of caries experience **did not show any significant associations** ($p > 0.05$) with toothbrushing supervision, the type of toothpaste used, the frequency of daily sugary food intake or dental attendance in the past two years.

Table 6.20 Logistic regression model to assess the associations of all combined current oral health behaviours at once with prevalence of children with dmft > 0 and then adjusting for sex, ethnicity, school type, parental education and household income sequentially

OR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Frequency of brushing per day at present						
Less than twice (ref)						
Twice and more	0.31 (0.12, 0.80), p=0.015	0.26 (0.10, 0.70), p=0.007	0.26 (0.10, 0.71), p=0.009	0.26 (0.09, 0.73), p=0.010	0.26 (0.09, 0.76), p=0.013	0.26 (0.09, 0.76), p=0.014
Toothbrushing supervision at present						
No supervision (ref)						
Adult supervision	0.87 (0.54, 1.41), p=0.573	0.84 (0.51, 1.37), p=0.484	0.88 (0.54, 1.45), p=0.625	0.86 (0.51, 1.43), p=0.557	0.82 (0.49, 1.38), p=0.447	0.84 (0.49, 1.42), p=0.516
Type of toothpaste used						
Adult fluoridated (ref)						
Child fluoridated	1.49 (0.27, 8.28), p=0.651	1.63 (0.28, 9.60), p=0.588	2.01 (0.35, 11.68), p=0.437	2.16 (0.3, 12.96), p=0.401	1.81 (0.30, 11.06), p=0.519	2.04 (0.33, 12.67), p=0.445
Non-fluoridated	2.98 (0.30, 29.21), p=0.349	2.67 (0.27, 26.24), p=0.401	3.12 (0.31, 31.40), p=0.334	3.35 (0.33, 34.13), p=0.307	3.10 (0.30, 32.18), p=0.342	3.25 (0.31, 33.85), p=0.324
Frequency of sugary food intake per day						
Once or less per day (ref)						
Two or three times	0.75 (0.40, 1.38), p=0.350	0.73 (0.39, 1.36), p=0.322	0.75 (0.40, 1.40), p=0.364	0.69 (0.36, 1.32), p=0.267	0.73 (0.38, 1.41), p=0.347	0.70 (0.36, 1.37), p=0.294
Four times or more	1.04 (0.57, 1.88), p=0.904	1.01 (0.55, 1.84), p=0.984	1.12 (0.61, 2.08), p=0.712	1.21 (0.64, 2.27), p=0.553	1.26 (0.66, 2.40), p=0.483	1.27 (0.66, 2.45), p=0.470
Frequency of sugary drink intake per day						
Once or less per day (ref)						
Two or three times	1.50 (0.82, 2.76), p=0.188	1.54 (0.83, 2.84), p=0.170	1.36 (0.73, 2.54), p=0.337	1.22 (0.64, 2.34), p=0.544	1.37 (0.71, 2.65), p=0.355	1.28 (0.66, 2.50), p=0.465
Four times or more	3.22 (1.22, 8.50), p=0.018	3.08 (1.16, 8.14), p=0.024	2.66 (0.99, 7.13), p=0.052	2.18 (0.80, 5.96), p=0.129	2.78 (0.96, 8.08), p=0.060	2.56 (0.87, 7.51), p=0.087
Dental attendance in the last two years						
Had visited (ref)						
No visit	0.79 (0.49, 1.28), p=0.335	0.78 (0.48, 1.27), p=0.322	0.73 (0.44, 1.20), p=0.216	0.69 (0.41, 1.15), p=0.150	0.70 (0.41, 1.17), p=0.174	0.70 (0.41, 1.18), p=0.183

Model 1: unadjusted; Model 2: adjusted for sex and ethnicity; Model 3: adjusted for sex, ethnicity and school type; Model 4a: adjusted for sex, ethnicity, school type and parental education; Model 4b: adjusted for sex, ethnicity, school type and household income; Model 5: Fully adjusted

6.4.5. ZINB analysis

6.4.5.1. Analysis of each early-life behaviour with the severity of caries experience in children

Appendix 23 shows the associations between **each** early-life oral health behaviour and the severity of caries in children when they were 2 to 3 years old, as analysed using the Negative Binomial portion (Count model) and the Zero-inflated portion (Caries-free) model. In the Negative Binomial portion, the analysis for models 3 to 5 reveals that the frequency of brushing per day at age 2 to 3 was **significantly negatively associated** with the severity of caries experience. Children brushing twice or more times daily **significantly reduced the severity of experiencing caries** in models 3 to 5, with the fully adjusted model showing a significant IRR of 0.67 (95% CI: 0.48 to 0.94; $p = 0.022$). Interestingly, **significant negative associations** were observed between the age of first dental visits and the severity of caries experience across all models. In models 1 to 5, children who never visited dentists had a **significantly reduced severity of caries experience** compared to those who had their first visit before 12 months of age, with model 5 with an IRR of 0.53 (95% CI: 0.34 to 0.83; $p = 0.005$). Across all models, there was **no significant association** ($p > 0.05$) between the severity of caries experience and these oral health behaviours, particularly, the age of starting toothbrushing, toothbrushing supervision at ages 2 to 3 or the age of stopping breastfeeding.

In the Zero-inflated portion, there were **negative significant associations** between the age of start brushing and the prevalence of having no caries experience in models 1, 2, 4b and 5. In the fully adjusted model, children who started brushing at the age of 6 to 12 months (OR: 0.33; 95% CI: 0.14 to 0.78; $p = 0.012$), 12 to 24 months (OR: 0.25; 95% CI: 0.09 to 0.72; $p = 0.011$) and 24 months and above (OR: 0.36; 95% CI: 0.14 to 0.92; $p = 0.032$) had **significantly decreased the odds of having no caries experience** compared to those who started brushing before the age of 6 months. There were **significant associations** of

prevalence of having no caries experience with toothbrushing supervision (in models 1 to 5) and age of stopping breastfeeding (in models 4b and 5). In all models, children who were supervised by adults **significantly increased the odds of having no caries experience** as compared to those who were not supervised during their brushings. Meanwhile, in model 4a and 5, children who stopped breastfeeding between the age of 12 and 24 months **significantly increased the odds of having no caries experience** (OR: 2.43; 95% CI: 1.03 to 5.75; $p = 0.044$ and OR: 2.63; 95% CI: 1.09 to 6.34; $p = 0.031$, respectively) in comparison to those who stopped breastfeeding at the age of 24 months and above. Finally, neither the frequency of daily toothbrushing nor the age of the first dental visit showed any significant associations ($p > 0.05$) with the prevalence of having no caries experience across all models.

6.4.5.2. Analysis of all combined early-life behaviour with the severity of caries experience in children

Appendix 24 summarises the results of a ZINB regression model used to assess the associations between **all combined** early-life oral health behaviours and the severity of caries experience in children at ages 2 to 3. For the Negative Binomial portion, there were **significant negative associations** for severity of caries experience with the frequency of daily brushing (in models 3 and 4a) and toothbrushing supervision (in model 2). Additionally, there were **significant negative associations** between the age of first dental visits with severity of caries experience across all models. In model 5, children who never visit dentists **significantly reduced the severity of caries experience** (IRR: 0.52; 95% CI: 0.33 to 0.82; $p = 0.005$) compared to those who visited dentists below the age of 12 months. From models 1 to 5, the severity of caries experience **did not show any significant associations** ($p > 0.05$) with the age of starting toothbrushing or the age of stopping breastfeeding.

For the Zero-inflated portion, there were **significant negative associations** between the age of starting brushing and the prevalence of having no caries experience in all models. In model 5, children who started brushing between 6 to 12 months (OR: 0.31; 95% 0.12 to 0.79; $p = 0.014$) and 12 to 24 months (OR: 0.23; 95% CI: 0.07 to 0.71; $p = 0.011$) **significantly increased the odds of having no caries experience** compared to those who started brushing earlier than 6 months. Meanwhile, there were **significant positive associations** for the prevalence of having no caries experience with toothbrushing supervision (in model 1), age of first dental visit (in models 1 and 2) and age of stopping breastfeeding (in model 5). In the fully adjusted model, children who stopped breastfeeding between the age of 12 and 24 months **significantly increased the odds of having no caries experience** (OR: 2.50; 95% CI: 1.03 to 6.10; $p = 0.044$). Lastly, only the frequency of daily brushing at age 2 to 3 was **not significantly associated** ($p > 0.05$) with the prevalence of experiencing no caries.

6.4.5.3. Analysis of each current oral health behaviour with the severity of caries experience in children

Appendix 25 demonstrates the associations between **each** current oral health behaviour and the severity of caries experience in children when they were 5 years old. In the Negative Binomial portion, only the types of toothpaste used was **significantly negatively associated** with the severity of caries experience, but the association was only observed in the unadjusted model. In model 1, children who used non-fluoridated toothpaste **significantly reduced the severity of caries experience** (IRR: 0.39; 95% CI: 0.17 to 0.92; $p = 0.032$) compared to those who used adult fluoridated toothpaste.

In the Zero-inflated portion, only the frequency of daily toothbrushing was **significantly positively associated** with the prevalence of having no caries experience. However, these significant associations were only observed in models 3 and 4a, and not in the fully adjusted model. In model 3 and 4a, children who brushed twice or more per day at age 5 **significantly increased the odds of having no caries experience** (OR: 6.23; 95% CI: 1.09 to 35.71; $p = 0.040$ and OR: 5.45; 95% CI: 1.12 to 26.59; $p = 0.036$, respectively) compared to those who brushed once or less per day.

6.4.5.4. Analysis of all combined current oral health behaviours at once with the severity of caries experience in children

Appendix 26 shows the results of a ZINB regression model used to assess the associations between **all combined** current oral health behaviours and the severity of caries experience in children at age 5 years. None of the current oral health behaviours showed any significant associations with the severity of caries experience and the prevalence of having no caries experience.

6.4.6. Summary of the results

The results of the primary analysis of the current oral epidemiological study are shown below.

6.4.6.1. General findings

The **prevalence** of 5-year-old children in Brunei Darussalam who had caries experience (i.e. dmft > 0) was 59.0% (95% CI: 54.0 to 64.6%). Meanwhile, the **severity of caries experience** (i.e. mean dmft) in 5-year-old children was 3.63 (95% CI: 3.13 to 4.13).

6.4.6.2. Sociodemographic characteristics

6.4.6.2.1. Descriptive data analysis results

- Brunei Malay children had a **higher severity of caries experience** (dmft: 3.88; 95% CI: 3.31 to 4.44) than Chinese and other ethnicities. This difference was significant ($p = 0.044$)
- Those attending government schools had a **higher prevalence** (72.3%; 95% CI: 66.2 to 78.4%) and **severity** (dmft: 5.44; 95% CI: 4.48 to 6.40) **of caries experience** compared to those attending private schools. These differences were significant ($p < 0.001$)
- Children with low parental education levels had a **higher prevalence** (76.0%; 95% CI: 70.1 to 81.9%) and **severity** (dmft: 5.76; 95% CI: 4.68 to 6.84) **of caries experience** compared to those with medium and high parental education levels. These differences were significant ($p < 0.001$)
- Children from low-income households had a **higher prevalence** (71.4%; 95% CI: 65.0 to 77.8%) and **severity** (dmft: 5.30; 95% CI: 4.35 to 6.25) **of caries experience** compared to those from medium- and high-income households. This difference was significant ($p < 0.002$)

6.4.6.2.2. Interpretation of these results

- There were **significant positive associations** between sociodemographic characteristics (particularly ethnicity, school type, parental education, and household income) and caries experience. Specifically, being of Brunei Malay ethnicity, attending government schools, having low parental education levels and living in low-income households were all **significantly associated with higher caries experience**

6.4.6.3. Child's early-life behaviours

6.4.6.3.1. Descriptive data analysis results

- Children who started brushing at the age of 12 to 24 months had a **higher prevalence** (66.7%; 95% CI: 60.1 to 73.3%) and **severity** (dmft: 4.33; 95% CI: 3.05 to 5.61) **of caries experience** than those who started brushing at the ages of 6 months and below, 6 to 12 months, or above 24 months. These differences were significant ($p = 0.015$ and $p = 0.009$, respectively)
- Those who brushed their teeth by themselves when they were 2 to 3 years old had a **higher prevalence** (79.1%; 95% CI: 73.3 to 84.9%) and **severity** (dmft: 5.26; 95% CI: 3.59 to 6.93) **of caries experience** than those who were supervised by adults. These differences were significant ($p = 0.003$ and $p = 0.004$, respectively)
- Children who started visiting dentists at the age of 12 months and below had a **higher severity of caries experience** (dmft: 4.53; 95% CI: 3.48 to 5.59) than those who started visiting at the age of 12 months and above, or who never visited dentists. This difference was significant ($p = 0.007$)

6.4.6.3.2. *Logistic regression analysis results (Based on fully adjusted models)*

- Children who started brushing at the age of 6 to 12 months (OR: 2.67; 95% CI: 1.31 to 5.45; $p = 0.007$), 12 to 24 months (OR: 3.72; 95% CI: 1.56 to 8.90; $p = 0.003$) and 24 months and above (OR: 2.55; 95% CI: 1.18 to 5.51; $p = 0.017$) had **significantly increased the odds of having caries experience** compared to those who started brushing before the age of 6 months
- Children who brushed with parental supervision when they were 2 to 3 years old **significantly reduced the odds of having caries experience** (OR: 0.24; 95% CI: 0.09 to 0.63; $p = 0.004$) compared to those who brushed without parental supervision
- Children who stopped breastfeeding between the age of 12 and 24 months **significantly reduced the odds of having caries experience** (OR: 0.49; 95% CI: 0.24 to 0.99; $p = 0.046$) compared to those who stopped breastfeeding after the age of 24 months

6.4.6.3.3. *ZINB regression analysis results (Based on fully adjusted models)*

Count model

- Children who brushed twice or more times per day when they were 2 to 3 years old **significantly reduced the severity of caries experience** (IRR: 0.67; 95% CI: 0.48 to 0.94; $p = 0.022$) compared to those who brushed once or less per day
- Children who never visit dentists **significantly reduced the severity of caries experience** (IRR: 0.53; 95% CI: 0.34 to 0.83; $p = 0.005$) compared to those who had their first dental visit before the age of 12 months

Caries-free model

- Children who started brushing at the age of 6 to 12 months (OR: 0.33; 95% CI: 0.14 to 0.78; $p = 0.012$), 12 to 24 months (OR: 0.25; 95% CI: 0.09 to 0.72; $p = 0.011$), and 24 months and above (OR: 0.36; 95% CI: 0.14 to 0.92; $p = 0.032$) had **significantly decreased the odds of being free from caries experience** compared to those who started brushing before the age of 6 months
- Children who brushed with parental supervision when they were 2 to 3 years old **significantly increased the odds of being free from caries experience** (OR: 5.32; 95% CI: 1.23 to 23.04; $p = 0.025$) compared to those who brushed without parental supervision
- Children who stopped breastfeeding between the age of 12 and 24 months **significantly increased the odds of being free from caries experience** (OR: 2.63; 95% CI: 1.09 to 6.34; $p = 0.031$) compared to those who stopped breastfeeding after the age of 24 months

6.4.6.3.4. Interpretation of these results

- There were **significant positive associations** between child's early-life behaviours (particularly the age of starting brushing and the age of the first dental visit) and caries experience. Specifically, children who started brushing at the age of 6 to 12 months, 12 to 24 months and above 24 months, and those who started visiting dentists before the age of 12 months were all **significantly associated with higher caries experience**
- Meanwhile, there were **significant negative associations** between child's early-life behaviours (specifically toothbrushing supervision at age 2 to 3, frequency of toothbrushing, age of stopping breastfeeding, and age of the first dental visit) and caries experience. Children who brushed with adult supervision, who brushed twice or more per day, who stopped breastfeeding between the age of 12 and 24 months, and who never visited dentists were **significantly associated with lower caries experience**

6.4.6.4. Child's current oral health behaviours

6.4.6.4.1. *Descriptive data analysis results*

- Children who brushed only once or less per day at age 5 had a **higher severity of caries experience** (dmft: 3.43; 95% CI: 2.90 to 3.95) than those who brushed twice or more per day. This difference was significant ($p = 0.004$)
- Those who used a full head length of toothpaste when they were 5 had a **higher prevalence** (71.9%; 95% CI: 65.7 to 78.1%) **and severity** (dmft: 4.77; 95% CI: 3.47 to 6.06) **of caries experience** than those who used pea-sized or smear-layer amounts of toothpaste. These differences were significant ($p = 0.029$ and 0.024 , respectively)
- Children who consumed sugary drinks four times or more per day when they were 5 had a **higher prevalence** (77.1%; 95% CI: 71.3 to 82.9%) **and severity** (dmft 5.40; 95% CI: 3.60 to 7.20) **of caries experience** than those who consumed sugary drinks once or less, or two or three times per day. These differences were significant ($p = 0.019$ and 0.003 , respectively)

6.4.6.4.2. *Logistic regression analysis results (Based on fully adjusted models)*

- Children who brushed twice or more per day at age 5 **significantly reduced the odds of having caries experience** (OR: 0.24; 95% CI: 0.09 to 0.65; $p = 0.005$) compared to those who brushed once or less per day

6.4.6.4.3. *ZINB regression analysis results (Based on fully adjusted models)*

Count and Caries-free model

- The ZINB analysis did not show any significant associations between the variables tested and the severity of caries experience

6.4.6.4.4. *Interpretation of these results*

- There were **significant positive associations** between child's current oral health behaviours (particularly the amount of toothpaste used and the frequency of sugary drink consumption per day) and caries experience. Specifically, children who used a full head length of toothpaste and those who consumed sugary drinks four times or more per day were **significantly associated with higher caries experience**
- Meanwhile, there was a **significant negative association** between the frequency of toothbrushing at age 5 and caries experience. Children who brushed twice or more per day were **significantly associated with lower caries experience**

Chapter 7

Study 3: Parents' understanding on children's oral health behaviours for maintaining oral health - A qualitative study

7.1. Introduction

Engaging with parents and valuing their perspectives are essential for developing an effective child oral health prevention programme [66]. This requires a deep understanding of families' influences on children's oral health, as they possess important knowledge about their children's daily challenges and needs [67]. However, this knowledge remains limited and a more profound insight into the complexities of parental's influences and understanding is necessary. The qualitative approach was used in this third study to understand parental understanding on the associations between children's oral health behaviours and oral health.

7.2. Study aims

The primary aim of this third study was:

- to investigate parents' understanding of the associations between children's oral health and their oral health behaviours

7.3. Methods

In this qualitative research study, the focus was on the perspectives of parents with young children, utilising qualitative research methods underpinned by the modified conceptual framework of Fisher-Owens, as previously mentioned in Chapter 1. This framework formed the basis for designing the interview schedule, aiming to gain a better understanding of parental views on children's oral health and the complex interaction between the child-level and family-level risk factors. The Consolidated Criteria for Reporting Qualitative Research (COREQ) was used to ensure thorough and transparent reporting of the study design, data collection and analysis processes [68].

7.3.1. Ethical approval

The ethical approval for this qualitative study was obtained in the same application as for the second study's ethical approval:

- Medical and Health Research Ethics Committee, Brunei on 19 April 2023 (Project Reference Number: MHREC/MOH/2023/3(1)) (Appendix 8)
- Trinity College Dublin Research Ethics Committee on 7 July 2023 (Project Reference Number: 221104) (Appendix 9)
- Data Protection Impact Assessment approval from the Data Protection Officer at Trinity College Dublin

7.3.2. Research team

7.3.2.1. Personal characteristics

The interviewer was the principal investigator of this thesis, who had 10 years of experience working as a general dental practitioner with an interest in dental public health. In 2020, he obtained a master's degree in dental public health from University College London. Building on his expertise, he conducted two focus group sessions in 2021 with "Toddler Smile" dental nurses and "School Dental Services" nurses to identify challenges and explore potential improvements for both programmes in Brunei Darussalam.

Another researcher involved in this study was responsible for verifying the accuracy of the transcripts by cross-referencing them with the recorded audio. She had a decade of experience as an allied health professional and held a master's degree in allied healthcare from Cardiff University. Her prior experience included transcribing and reviewing audio recordings for a service evaluation study, which assessed and analysed the dental care services available to patients with head and neck cancer at a university hospital in Dublin.

7.3.2.2. Relationships with study participants

The research team had no prior relationships with the participants before the study began. Participants were informed about the interviewer's role and the study's objectives before the interviews commenced. Informed consent was obtained, including permissions to record the interviews and present anonymised quotes in the final report. It is important to note that the interviewer also served as the principal investigator, which may introduce potential biases or assumptions based on personal interests and perspectives regarding the research topic.

7.3.3. Study participants

Eligible participants were parents or guardians of 5-year-old children who participated in Study 2. The children could either have had caries experience or not during the dental examination. The parents were conveniently selected to ensure diversity in parental and child socioeconomic characteristics, including educational attainment, monthly household income, gender, children's gender, ethnicity and school type.

7.3.3.1. Inclusion criteria

The parent or guardian was included if:

- the child participated in the dental examination
- they had given consent for the interview
- they were able to communicate in Malay, English, or Chinese

Malay and English languages are widely spoken and understood by the Brunei population. For those Chinese parents who had limited proficiency in Malay and/or English, an interpreter who was a qualified dentist fluent in Chinese would assist with the interview.

7.3.3.2. Exclusion criteria

The parent or guardian was excluded if:

- the child did not participate in the dental examination
- they had not consented to the interview
- they did not speak Malay, English, or Chinese

7.3.3.3. Participant recruitment

Eligible participants who indicated their interest in participating in an interview by ticking the appropriate box on the parental questionnaire in the second study were contacted by the principal investigator via email and the provided phone number. Potential participants were asked if they would be willing to take part in an online interview. They were given the online-based PIL (Appendix 27) detailing the aspects of the qualitative study. If they expressed interest, they completed the consent form (Appendix 28) and returned it to the principal investigator. Participant recruitment started in November 2023 and continued until 'theoretical saturation' was reached, the stage where sufficient themes were identified and were considered clear enough that additional interviews did not produce any new ideas.

7.3.4. Data collection

Data were collected via semi-structured interviews with parents carried out over the Zoom for 20 to 30 minutes at an agreed slot from November to December 2023. They were given opportunities to choose the available date and time for the interview that took place via the online Zoom using the 'audio' function only without showing their videos. Prior to the commencement of the interview, participants were requested once more to grant permission for the recording of the interview, either through Zoom or a voice recorder endorsed by TCD.

7.3.4.1. Interview schedule

The objective of the interview schedule was to prompt parents to discuss their views related to the research questions, while remaining unaware of their children's oral health status as determined during the dental examinations. An interview schedule was utilised for each interview session and was provided in both English and Malay languages (Appendices 29 and 30). Back-to-back translations for the transcripts were conducted by the Institute of Language and Literature. The schedule was pilot tested with two parents prior to the commencement of the main study. Based on these, some minor revisions to the guide were undertaken.

7.3.4.2. Tasks after data collection

The audio recordings were uploaded to a password-protected Microsoft 365 account, which served as a secure online platform for storing and sharing files among authorised researchers (BD, CJ, RM and IZ) involved in this study. Any audio recordings in the Malay language were manually transcribed into text in Malay by the principal investigator of this thesis (MB). Conversely, recordings in English were transcribed using Microsoft Stream by the principal investigator (MB) too, which utilises a built-in transcription feature capable of converting speech to text. The resulting text transcripts were anonymised and saved in Microsoft Word documents, then stored within the password-protected Microsoft 365 account by the principal investigator (MB). This is to ensure that the transcripts remained secure and accessible exclusively to authorised researchers (BD, CJ and RM) of this study.

Another researcher (IZ) participating in this study reviewed them in order to verify the accuracy of the transcripts. This process was an essential quality control measure that helped to ensure the reliability of the data collected. Participants were also given the opportunity to review the transcripts for a period of seven days. No response to the transcript checking was interpreted as the participants' agreement with the transcripts, indicating no corrections were necessary.

7.3.5. Data analysis

Given that the study's aim was to generate ideas rather than validate participants' existing theories, an inductive method of data analysis was deemed suitable. This method involved “coding and identifying patterns in data without the constraint of fitting them into a predetermined coding framework” [69]. Thematic analysis stands as a frequently employed inductive technique for examining interview transcripts [69]. Instead of postponing data analysis until the study's conclusion, transcripts were analysed in batches allowing the findings from earlier interviews to guide the subsequent recruitment of participants. Thematic analysis is a technique for identifying, examining and articulating patterns (themes) within data. NVivo version 12 software facilitated this process, with the analysis generally adhering to a structured approach consisting of the following five-step procedure [69]:

7.3.5.1. Familiarisation with interview data

At each phase of data analysis, the principal investigator read through each transcript meticulously to become familiar with the data. This was followed by notetaking and making initial reflections on possible themes or patterns that emerge.

7.3.5.2. Generation of codes

Subsequently, the texts were read line-by-line and labelled or coded by highlighting phrases or sections that appeared relevant to the research questions. NVivo 12 was used to organise these codes and to label the relevant sections of texts accordingly.

7.3.5.3. Generation of themes

At this stage, the generated codes and the coded segments were reviewed to identify potential themes. Codes that seemed to represent aspects of the same theme were then grouped together and organised using NVivo's tools.

7.3.5.4. Review of themes

It was important to review each generated theme to ensure that it was well-supported by the coded data. At this stage, connections between themes were assessed and any considerations whether any themes should be merged or split should be made, as necessary.

7.3.5.5. Defining and naming of themes

The final stage of data analysis involved defining each theme clearly, considering its essence and the underlying concept it represented. Each theme was finally named appropriately and organised with NVivo 12 to capture its meaning before writing up the results of the analysis.

7.4. Results

7.4.1. Demographic characteristics

Table 7.1 summarises the demographic characteristics of 5 study participants for interview sessions. Three participants had secondary education, while two had bachelor's degrees. Household income varied, with three participants from high-income households and two from low-income households. The gender distribution included three male parents and two female parents, as well as three male children and two female children. Four children attended private schools and one attended a government school. Regarding caries-free status, three children were caries-free, while two experienced caries.

Table 7.1 Demographic characteristics of the study participants for interview sessions

Participant no.	Parental education	Household income*	Parent gender	Child gender	Child's school type	Caries-free
1	Bachelor's degree	High	F	M	Private	Yes
2	Bachelor's degree	High	M	F	Private	Yes
3	Secondary	High	M	M	Private	Yes
4	Secondary	Low	M	M	Government	No
5	Secondary	Low	F	F	Private	No

*Household income received per month – Low: less than B\$2,000 (or equivalent to less than € 1,414), medium: B\$2,000 to 2,999 (or €1,414 to €2120), high: B\$3,000 and above (or €2,121 and above).

7.4.2. Interview data

7.4.2.1. Theme 1: Children's oral hygiene practices

This theme emerged as a key area of interest in this study, demonstrating strong grasp parents have on the preventive measures necessary to protect their children's dental health. This theme is important because it highlights the most positive oral hygiene practices among parents, with only minor areas where knowledge could be further enhanced.

7.4.2.1.1. Subtheme 1. Frequency of daily toothbrushing

Within the context of daily brushing routines, participant 2 stated that her approach to her child's dental hygiene involves a routine twice-daily dental care practice, including night-time brushing.

Original quote:

“Okay pada masa sekarang usually kalau pagi-pagi sama kalau bangun kami suruh barus gigi dulu, then seterusnya malam jua... Dari pandangan saya, ani kali antara penyebab-penyebab gigi sihat” (Participant 2)

English translation:

“Okay, nowadays, usually in the morning when he wakes up, we tell him to brush his teeth first and then again at night... From my perspective, this is one of the factors contributing to healthy teeth.”

The quote indicates that the parent understood the associations of good oral health with the importance of toothbrushing twice daily and brushing children's teeth at night.

7.4.2.1.2. Subtheme 2. Use of a toothbrush timer

In exploring the brushing habits of children, a significant theme that emerged was the use of a toothbrush timer. Participant 1 highlighted the impact of this tool in ensuring their child brushed for the recommended two minutes.

Original quote:

“Bagi pandangan saya, one of the factors that could contribute to good oral health is using a timer. My son uses the toothbrush yang ada timer... he cannot stop unless the timer is up after two minutes.” (Participant 1)

English translation:

“In my opinion, one of the factors that could contribute to good oral health is using a timer. We also use the toothbrush that has a timer... he cannot stop unless the timer is up after two minutes.”

This quote shows that the parent was not only aware of the importance of brushing but also understood the importance of brushing for two minutes for effective oral hygiene.

7.4.2.1.3. Subtheme 3. Independent brushing efforts and post-brushing oral hygiene monitoring

Regarding parental supervision during brushing and oral hygiene monitoring after brushing, participants discussed their practices. Participant 1 told her son to be independent in brushing from an early age and she did occasional dental monitoring.

Original quote:

“He knows sudah dari awal like he has to brush teeth di dapan and belakang. He is quite independent that way. Once in a while, I will just make spot check giginya sendiri. At least nampak macam ada gigi yang kamah kah inda.” (Participant 1)

English translation:

“He knows from an early age that he has to brush his front and back teeth. He is quite independent in that way. Once in a while, I will just do a spot check of his teeth. At least I can see if there are any dirty teeth.”

Similarly, Participant 2’s child also brushed independently with occasional dental health monitoring by the parents.

Original quote:

“Ia berus gigi sendiri sejak umurnya 4 ke 5 tahun tapi kadang kami mencheck jua giginya, kalau macam masih belum memuaskan, kami suruh ia bersih lagi.”
(Participant 2)

English translation:

“He brushes his teeth by himself from the age of 4 to 5, but sometimes we check his teeth too. If it seems unsatisfactory, we tell him to clean them again.”

Both quotes suggest that there was a gap in understanding regarding the association between the appropriate age for parental supervision of brushing and children’s oral health.

7.4.2.1.4. Subtheme 4. Adherence to dental recommendations for toothpaste quantity

In discussing the adherence to dental recommendations for toothpaste quantity, participants emphasised the importance of using the correct amount. Participant 5 noted that she provided her child with toothpaste in accordance with the dentist's suggested measurement.

Original quote:

“Saya kalau bagi dorang ubat gigi bukan banyak tapi mengikut sukatan yang disarankan oleh dentist.” (Participant 5)

English translation:

“When I give them toothpaste, it's not a lot, but according to the measurement given by the dentist.”

Participant 1 also ensured that her child used neither too much nor too little toothpaste, following the guidelines provided by the dental clinic.

Original quote:

“We make sure that the amount that he's using is correct macam jangan too banyak jangan too sikit like the size yang mesti lurus... We're just following what the clinic says.” (Participant 1)

English translation:

“We make sure that the amount he's using is correct, like not too much, not too little. The size must be right. We're just following what the clinic says.”

The quotes from Participants 5 and 1 reveal that these parents understood the importance of using the correct amount of toothpaste when brushing their children's teeth. They also mentioned following the guidance provided by dental professionals, which indicates a good understanding of the association between proper oral hygiene practices and oral health.

7.4.2.1.5. Subtheme 5. Experiences with different toothpaste

Exploring into the experiences with different types of toothpastes, participants shared views that reflect the impact on children's brushing habits and preferences. Participant 2 discussed the contrast between 'Colgate Kids' toothpaste, which has less than 1,000 ppm of fluoride, and regular adult toothpaste.

Original quote:

"Okay, so far. Hari atu ada kami cubakan sudah ubat gigi dewasa dengan 'Colgate Kids'... Tapi hairan jua bila 'Colgate Kids' ani dicuba, terasa manis sikit daripada yang biasa... Ganya inda pasti ani bagus atau inda untuk kesihatan gigi" (Participant 2)

English translation:

"Okay, so far. We've tried regular adult toothpaste with 'Colgate Kids'... It's surprising that when we tried 'Colgate Kids', it felt a bit sweeter than the regular one... But not sure if this one is good or not for dental health."

Meanwhile, Participant 4 mentioned a specific recommendation from a child dental clinic to use 'Colgate Siwak', which is an adult toothpaste with 1,450 ppm of fluoride.

Original quote:

"Colgate yang kami kana sarankan oleh klinik pergigian yang bahagian kanak-kanak, untuk menggunakan ubat gigi dewasa jenis 'Colgate Siwak'."
(Participant 4)

English translation:

"The Colgate that was recommended to us by the child dental clinic is to use adult toothpaste called 'Colgate Siwak'."

These quotes suggest a mixed understanding of the association between good oral health and using toothpaste with at least 1,000 ppm of fluoride.

7.4.2.2. Theme 2. Children's dietary habits

The second theme emerged as an important area of exploration in the study, showing the complex interplay between dietary choices and the prevention of dental caries. This theme is significant because it reveals a mixed landscape of knowledge and practice among parents, highlighting both the positive steps taken to promote oral health through diet and the gaps in understanding that may inadvertently contribute to caries risk. The subthemes within this category include beverage preferences and drinking habits, as well as dietary preferences and eating patterns.

7.4.2.2.1. Subtheme 1. Beverage preferences and drinking habits

Within the exploration of dietary habits in children aged 4 to 5, the theme of beverage preferences and drinking habits emerged as an important factor in dental health. Participant 1 highlighted her child's high-water intake, sometimes reaching several bottles a day and the consumption of 'Dutch Lady' fresh milk at least once daily. It is worth noting that this particular milk brand contains no added sugars, with the sugars present being naturally occurring lactose found in milk [70].

Original quote:

"He drinks a lot of water; kadang-kadang he will drink several bottles. He continues to drink 'Dutch Lady' fresh milk until now. We encourage him to drink it sekurang-kurangnya sekali atau dua kali dalam sehari... So, I guess that plays a factor yang menyebabkan gigi anak saya nada yang buruk". (Participant 1)

English translation:

"He drinks a lot of water; sometimes he will drink several bottles. He continues to drink 'Dutch Lady' fresh milk until now. We encourage him to drink it at least once or twice a day... So, I guess that plays a factor that causes my child's teeth to be in good condition."

According to Participant 3, he restricted his child from consuming sugary beverages, despite the child starting to drink them.

Original quote:

“Kalau minuman, inda ku biasakan kedia minum fizzy, ‘Milo’, hot chocolate drinks. Dalam berapa bulan ani ada sudah pandai minum. Tapi dalam sehari, jarang dibagi sebab takut giginya buruk.” (Participant 3)

English translation:

“I don't usually let him have fizzy drinks, ‘Milo’, or hot chocolate. Over the past few months, he has started to drink them. But they are rarely given in a day, as I am afraid his teeth might get rotten.”

These quotes suggest that the parent had a good understanding of the benefits of consuming plenty of water and fresh milk without added sugar for children's oral health. Additionally, there was a clear understanding of the significant impact that frequent consumption of sugary beverages can have on oral health.

7.4.2.2.2. Subtheme 2. Dietary preferences and eating habits

This subtheme highlights children's dietary preferences and eating habits. Participant 5 mentioned that her child was picky and mainly ate healthy, balanced foods.

Original quote:

“Anak saya ani memilih makanan sikit. Ia only makan nasi, sup potato dan sup ayam. Ia ani suka jua makan buah. Rasanya makanan cani ani yang membuatkan gigi sihat” (Participant 5)

English translation:

“My child is a bit picky with food. He only eats rice, potato soup, chicken soup. He also likes to eat fruits. I feel these types of foods make teeth healthy.”

Additionally, Participant 4 described his 5-year-old son as having a preference for consuming small quantities of chocolates frequently.

Original quote:

“Pada masa ani, anak saya suka makan coklat tapi sedikit setiap kali makan. Ganya anak saya ani makan coklat lebih daripada tiga kali sehari. Bagi saya, kerosakan gigi ani disebabkan oleh pengambilan makanan manis dalam kuantiti yang banyak dalam satu hidangan. Bukannya disebabkan oleh selalu memakannya dalam sehari.” (Participant 4)

English translation:

“These days, my child likes to eat chocolates in small amounts at a time. However, he eats them more than three times per day. In my opinion, bad teeth occur due to consuming large quantities of sweet foods in a single serving, rather than from the high frequency of consuming them throughout the day.”

These parents had varying levels of understanding regarding the associations between dietary behaviours and oral health. One of them was aware of the need to include nutritious foods, such as fruits. Meanwhile, the other did not understand that frequent consumption of sugary snacks could harm dental health.

7.4.2.3. Theme 3. Breastfeeding and bottle-feeding practices

This theme emerged as an important area of exploration in the study, demonstrating the associations between any feeding practices and the prevention of dental caries.

7.4.2.3.1. Subtheme 1. Breastfeeding practices

Participant 1 ensured the child drank water after night-time breastfeeding, a practice that can reduce the risk of dental caries, as advised by the dental staff.

Original quote:

“Dental staff cakap make sure he drinks water after breastfeeding malam, because it’s milk... I guess drinking water after breastfeeding is good for teeth.” (Participant 1)

English translation:

“The dental staff said to make sure he drinks water after breastfeeding at night, because it's milk... I guess drinking water after breastfeeding is good for the teeth.”

Meanwhile, Participant 5 mentioned that the son stopped breastfeeding at 2 years old, which aligned with the recommendation to wean from breastfeeding by this age.

Original quote:

“Ia beranti penyusuan ibu masa umur 2 tahun, macam yang kana sarankan oleh nurse pergigian.” (Participant 5)

English translation:

“He stopped breastfeeding at the age of 2 as suggested by the dental nurse.”

Both quotes suggest that the parents understood the association between giving water after night-time breastfeeding and stopping breastfeeding at age 2 to maintain good dental health.

7.4.2.3.2. Subtheme 2. Bottle-feeding practices

In order to understand the influence of bottle-feeding practices on dental health, participants shared their perspectives that reflect a conscious effort to reduce significant risks. Participant 4 mentioned being advised by a nurse to use formula milk through a feeder cup before one.

Original quote:

“Saya disarankan oleh nurse pergigian untuk memakai susu formula melalui cawan feeder cup, sebelum menjangkau umurnya 1 tahun. Saya tau ianya bulih menjejaskan gigi anak saya kalau tabiat ani diteruskan.” (Participant 4)

English translation:

“I was advised by the dental nurse to use formula milk through a feeder cup before reaching 1 year old. I know that it could affect my child's teeth if this habit continues..”

Participant 3 stated his child drank formula milk from a bottle until age 4, which suggest a less clear understanding of the recommendation to transition from bottles to cups by the age of 1.

Original quote:

“Selepas 2 tahun, ia minum susu formula dalam botol. Untuk kedia cuma Dumex saja sampai umurnya 4 tahun labih. Inda pulang ku pasti yang menyusu botol selapas 2 tahun ani menyebabkan gigi buruk.” (Participant 3)

English translation:

“After 2 years, he drank formula milk from a bottle. He only consumed Dumex brand until he was over 4 years old. Not sure if children who drink from a bottle after the age of 2 can cause to have bad teeth.”

From these quotes, there was at least a good understanding of children's oral health and the use of the feeder cup before reaching 1 year old as suggested by dental professionals. However, there was a poor understanding regarding the association between the age of stopping bottle-feeding and oral health.

7.4.2.4. Theme 4. Children's dental care experiences

This theme was relevant because it indicates the importance of early and consistent dental visits in shaping children's oral health related behaviours and overall oral health. Subthemes generated include children's first dental visits, recent dental visits within the past two years and child's behaviours during dental visits.

7.4.2.4.1. Subtheme 1. First dental visits

The importance of first dental visits for children cannot be overstated, as these early appointments establish the foundation for a lifetime of oral health. Participant 1 described their child's first dental visit, which occurred before the age of 1 as part of the "Toddler Smile" programme.

Original quote:

"His first visit was before umurnya setahun because every few months have to jumpa kan under that dental programme and that was sebelum COVID-19. I understand this visit is important for dental health awareness." (Participant 1)

English translation:

"His first visit was before he turned one year old under that dental programme, we have to bring him for check-ups every few months and that was before the COVID-19 pandemic. From this first visit, a lot of advice was given. I understand this visit is important for dental health awareness."

Similarly, Participant 2 recalled an early dental experience where his child had a check-up at 6 months old, initiated by an invitation from a dental clinic under the “Toddler Smile” programme.

Original quote:

“Masa umurnya 6 bulan sudah bercek gigi... masatu kana panggil oleh klinik pergigian di Lambak. Dari sini tah saya tau yang becek gigi sedari umur damit ani penting untuk penjagaan gigi.” (Participant 2)

English translation:

“When he was 6 months old, his teeth were already being checked... at that time, we were called by the dental clinic in Lambak. It was from there that I learned that checking teeth from an early age is important for dental care.”

The quotes indicate the proactive nature of these parents in attending the scheduled early dental visits recommended by the Department of Dental Services for their children. This suggests that they have a good understanding of the association between children’s oral health and the importance of preventive dental visits via clinic invitations for dental examinations.

7.4.2.4.2. Subtheme 2. Child's behaviours during dental visits

The adaptation of young children to dental visits is a crucial factor in shaping their future attitudes and behaviours towards oral health. Participant 2 shared a journey of his child's initial fear of familiarity and acceptance as he grew older.

Original quote:

"Masa umurnya 1 tahun, ia macam takut-takut di klinik gigi. Tapi udah nya basar, inda ia takut lagi. Bagiku pendedahan awal ke klinik gigi sedari awal itu bagus untuk kesehatan gigi." (Participant 2)

English translation:

"When he was 1 year old, he seemed a bit scared at the dental clinic. But as he grew older, he wasn't afraid anymore. Early exposure to the dental clinic from a young age is good for maintaining good dental health."

Meanwhile, participant 4 highlighted his child's fearless approach to dental visits, with the child independently taking a seat on the dental chair for check-ups.

Original quote:

"So far, anak saya nada takut apa-apa. Masuk saja ke klinik gigi, ia sendiri duduk ke kerusi untuk bercek gigi secara rutin. Apa yang saya tau, anak saya yang sebelum ini takut banar kan bercek gigi, yatah banyak inda sihat tu giginya." (Participant 4)

English translation:

"So far, my child isn't afraid of anything. As soon as we enter the dental clinic, he sits on the chair by himself for his routine check-up. From what I know, my previous child was scared of dental check-ups. As a result, their teeth weren't healthy."

These quotes indicate that parents were aware of the association of maintaining oral health and being familiar with the dental environment on reducing children's fear.

7.5. Summary of the results

This study identified various themes demonstrating parental understanding of the associations between children's oral health and their oral health behaviours. The thematic analysis is divided into four key themes.

- **Theme 1: Children's oral hygiene practices**

This theme indicates a good parental understanding of the associations between good oral health and important oral hygiene practices, including using the correct amount of toothpaste, brushing teeth twice daily, maintaining proper brushing duration and monitoring oral hygiene after brushing. However, there was a mixed understanding regarding the importance of using toothpaste containing at least 1,000 ppm fluoride for maintaining oral health. Additionally, there was a misunderstanding about the necessity of brushing at night from an early age and the need to supervise children's brushing until the age of 7.

- **Theme 2: Children's dietary habits**

Parents demonstrated an understanding of the associations between good oral health and the importance of consuming water, plain milk and nutritious foods. However, this theme also reveals a misunderstanding about the need to limit sugary beverages and foods and to avoid them close to bedtime for maintaining good oral health.

- **Theme 3: Breastfeeding and bottle-feeding practices**

In this theme, parents demonstrated a good understanding of the associations between good oral health and practices such as using feeder cups before age 1, giving water after breastfeeding, stopping breastfeeding at age 2 and offering appropriate bottle contents. However, parents showed a misunderstanding about the importance of stopping bottle-feeding at age 1 to support optimal oral health.

- **Theme 4: Children's dental care experiences**

This theme reveals that parents understood the association between maintaining good oral health and two important aspects: the importance of preventive dental visits and reducing fear through regular visits

Chapter 8

Discussion

8.1. Introduction

This chapter reviews and discusses the overall findings of the thesis from Studies 1, 2 and 3. It then demonstrated the strengths and limitations of the methodologies used across the three studies. Finally, it provided recommendations for oral health prevention strategies to inform relevant stakeholders in Brunei Darussalam, particularly the dental public health team.

8.2. Integration of results from all studies

Studies 1 and 2 provided an overview of the prevalence and severity of caries experience among 5-year-old children in Brunei Darussalam, as well as the significant associations between caries experience and various sociodemographic factors and oral health behaviours. This integration is important because it allows for an examination of the prevalence of caries experience in children aged 5 over time, despite the fact that both surveys analysed only cross-sectional data. The integration of the results demonstrated trends in caries experience among children in 2015 and 2023 and it also provided understandings into how various sociodemographic factors and oral health behaviours influence children's dental health over the eight-year gap between surveys.

The findings from Studies 1 and 2, which demonstrated the significant associations between oral health behaviours and caries experience, are further complemented by Study 3 that explored parents' understanding of the associations of children's oral health behaviours and for maintaining good oral health. Together, these three studies formed a foundation for understanding the multifaceted determinants of dental caries in young children and informing evidence-based interventions to improve oral health outcomes.

8.2.1. Prevalence and severity of caries experience among children

The prevalence of caries experience among 5-year-old Bruneian children in 2015 was 73.2%, with a mean dmft of 5.12. By 2023, the prevalence was identified as 59.0%, with a mean dmft of 3.63.

Both studies adhered to the fifth edition of the WHO's guidelines on oral health survey methods, ensuring a standardised framework for dental examinations. However, it is important to note that direct comparisons between the results of the two years are not entirely appropriate due to differences in specific methodologies (ARCPOH versus BASCD) that may have subtle variations in implementation. Additionally, differences in data collection methodologies, particularly in geographic coverage and sampling methods, further complicate direct comparisons.

Despite these methodological differences, an exploratory comparison of the results from 2015 and 2023 indicated significant progress in reducing caries experience among 5-year-old children in Brunei Darussalam. The observed improvements are promising and suggest that previous public health interventions may have produced positive outcomes. Further efforts from the Brunei Department of Dental Services are important to further improve the oral health status of children. However, caution should be exercised when interpreting these results due to the differences in methodologies and data collection approaches.

8.2.2. Associations of socioeconomic characteristics and caries experience in children

Although the 2015 CNOHS analysis only identified significant associations of caries experience with school types and ethnic background, the 2023 survey revealed additional significant associations with parental education level and household income. Study 2 demonstrated that there were significant social gradients in the prevalence and severity of caries experience among children by parental and household income, whereby those children from the lowest parental education and lowest household income families had the highest prevalence and severity of caries experience compared to those children from the highest socioeconomic groups.

The expanding range of significant sociodemographic variables in the more recent survey highlighted the growing recognition of the importance of children's ethnic backgrounds, educational environments and socioeconomic factors in influencing dental health outcomes. This suggests the need for complex approaches in future public health interventions to effectively address and improve children's oral health and reduce inequalities in oral health regardless of their sociodemographic backgrounds. In addition to universal strategies that aim to benefit all children, one of the recommendations for targeted approaches could involve interventions specifically designed to support children from lower socioeconomic status backgrounds. By combining universal measures with these focused efforts, dental public health strategies can more effectively address the diverse needs of all children and reduce oral health inequalities [71].

8.2.3. Associations of oral health behaviours and caries experience in children

8.2.3.1. Breastfeeding and bottle-feeding practices

Findings from Study 2 demonstrated that the age at which breastfeeding was stopped plays a significant role in the development of dental caries. This contrasts with a national level study conducted in the US, which indicated no significant association between duration of breastfeeding and early childhood caries [72]. Study 3 further explored this association and revealed that parent participants had a good understanding of the association between stopping breastfeeding at age 2 and giving water after breastfeeding to maintain good dental health. These breastfeeding practices were aligned with the WHO's "Breastfeeding guidelines", which recommend that mothers continue breastfeeding up to two years of age [73].

The findings from Study 3, which collected information on children's bottle-feeding practices after breastfeeding, revealed that parents were not fully aware of the importance of stopping bottle-feeding by the age of 1 as suggested by the UK's "Delivering Better Oral Health" guidelines [41], although they were aware of the possibility of transitioning to a feeder cup before that age as an alternative to breastfeeding. This is consistent with the observations from another study that indicated a cultural norm of continuing bottle-feeding at bedtime even after the child turns 12 months old, despite recognition of the risk for caries [74].

8.2.3.2. Dietary practices

The findings from Study 2 also demonstrated a significant association between the frequency with which they consumed sugary drinks daily and caries experience in children. There was also an association between children's caries experience and the frequency of daily sugary food intake, but it was not significant. Another evidence indicated that children who regularly consumed sugary foods and drinks had a significantly higher risk of experiencing caries [42]. Study 3 further indicated that the parent participants misunderstood the importance of restricting the frequency of sugary beverages and foods. This misunderstanding persisted despite systematic evidence and the UK's "Delivering Better Oral Health" suggesting that limiting the intake of free sugars in food and beverages could lower the risk of caries. [41, 75].

8.2.3.3. Oral hygiene practices

The first and second studies demonstrated that oral hygiene behaviours could contribute to the caries status of children. These oral health behaviours include the age at which children commence toothbrushing, the extent of parental supervision during the ages of 2 to 3, the frequency of brushing daily at ages 2 to 3 and 5 and lastly, the type and quantity of toothpaste used. These findings indicate the significant impact of each oral hygiene practice on the dental health outcomes of children aligned with other studies [48, 76, 77] and the UK's "Delivering Better Oral Health" guidelines [41].

Study 3 further contributed to this understanding by indicating that the parent participants had a good understanding of the association between good oral hygiene and brushing their children's teeth as the last activity done at night, starting from early childhood. However, parents displayed varied levels of understanding regarding the importance of initiating toothbrushing at an early age and selecting suitable types of toothpaste for their children. Additionally, there was poor awareness among parents about the significance of supervising their children's toothbrushing from a young age until they reach the age of 7.

8.2.3.4. Dental attendance

Finally, the thesis results showed that the age at which children started visiting dentists was associated with caries experience. Surprisingly, those who never visit a dentist were less likely to experience caries than those who visited a dentist before they turned one. This could possibly be due to selective attendance due to COVID-19. During the second wave of COVID-19, the “Toddler Smile” programme was not operational. This programme provides preventive dental care to all young children from the age of 6 months to 5 years. Without this programme, only children with urgent dental issues visited dentists. Generally, visits to health care facilities were impacted as the COVID-19 pandemic hit the world in March 2019. Between 2019 and 2020, there was a significant reduction in dental attendance among children aged 1 to 5 years in the US, from 64.0% to 56.7% [78].

8.3. Overall methodological strengths

The strengths of the thesis are diverse and contributed to the strength and reliability of the research findings. Firstly, the high response rate was a significant strength of Study 1 and 2. Both studies outlined a comprehensive approach to ensure a high participant response rate. The survey administration team was responsible for sending out survey packs to all sampled children containing participant information leaflets, consent forms and questionnaires. The documents were designed to explain the survey rationale and provide details about the clinical examination in simple language.

Additionally, in the first and second studies, a second wave of survey packs was distributed to those who failed to respond to the initial contact, demonstrating a proactive approach to maximising the response rate. Furthermore, both studies strongly emphasised using validated questionnaires and clinical dental examinations. In Study 2, a modified version of the validated questionnaire from the 2015 CNOHS was utilised in the study. The original 2015 CNOHS questionnaire in Study 1 was developed and validated by the Department of Dental Services, Ministry of Health and ARCPOH. This ensured that the questions included

in the questionnaire had been rigorously tested for reliability and validity, enhancing the credibility of the data collected. In addition to the validated questionnaires, both studies involved clinical dental examinations conducted by two dental examiners. The protocol specified the process for standardising the dental examiners and emphasised the importance of inter-examiner reliability. The dental examination was based on the protocol from the BASCD to ensure consistency and accuracy in recording dental findings. This meticulous approach to clinical dental examinations contributed to the reliability and precision of the oral health data obtained from the study participants.

Moreover, the principal investigator acknowledged the considerable amount of missing data for certain variables in the 2015 survey (Study 1) and took proactive steps to address this issue. The possible reasons for the missing data were carefully analysed and to mitigate the impact of missing data, the principal investigator performed complete data analysis for other oral health-related behaviours with data missingness less than 10%. This strategic decision demonstrated a proactive approach to handling missing data and ensured that the analysis results maintained statistical power and minimised bias in the estimation of parameters.

8.4. Overall methodological limitations

The overall the thesis has several methodological limitations that should be considered when interpreting the results. First, the thesis employing a cross-sectional design means that causal relationships cannot be inferred from the data analyses alone. Cross-sectional studies provide a snapshot of a population at a specific time, but they do not allow for determining cause-and-effect relationships [79]. Therefore, while Studies 1 and 2 can identify associations between variables, it cannot establish the direction of causality. For example, while the study may find associations between certain oral health behaviours and the prevalence of caries experience among 5-year-olds, it cannot definitively conclude that the behaviours cause caries.

Secondly, the thesis relied on questionnaires for data collection, especially about parental education, household income and oral health behaviours. This reliance on self-reported data introduces the potential for reporting and recall biases [80]. Respondents may provide inaccurate information due to social desirability bias, where they report what they believe is socially acceptable rather than the truth [81]. Additionally, recall bias may occur when participants need to remember past events or experiences more accurately. For example, parents may need to accurately recall the age at which their child started brushing their teeth or their child's tooth brushing frequency. These biases can impact the accuracy and reliability of the data collected, significantly influencing the study's findings and conclusions [80]. Furthermore, the study's reliance on parental-completed questionnaires introduces the potential for interpretation bias. Parents' responses may be influenced by their understanding of the questions, leading to variations in interpretation. This could affect the data's consistency and validity, particularly concerning oral health behaviours and other sociodemographic factors.

Another limitation of the thesis is the potential for selection bias. The sample of 5-year-old children in the survey may only partially represent the entire population of Brunei Darussalam. School attendance, parental consent and other participation criteria may have influenced the sample's composition. As a result, the study's findings may need to be more generalisable to the wider population of 5-year-olds in the country. Moreover, the fact that in Study 3, parent participants were selected conveniently would cause further bias, as it might not accurately reflect the diverse socioeconomic and demographic characteristics of the overall parent population. This convenience sampling could limit the validity and reliability of the study's conclusions, making it challenging to apply the findings universally across different groups within the country.

Finally, a minimal sample size in the qualitative research can restrict the depth of insights generated. It limits the variability of perspectives that can be captured, leading to findings that are not representative or generalisable to a broader population. Furthermore, with such a small sample, the ability to identify themes or nuanced differences in experiences may be limited, raising concerns about the validity and reliability of the qualitative findings [82]. These methodological constraints demonstrate the need for caution in interpreting the results and suggest recommendations for future research to address these limitations by increasing sample sizes for qualitative analysis.

8.5. Recommendations for oral health prevention strategies

One of the key challenges in providing oral health advice or interventions by dental practitioners is the inconsistent attendance of parents and children from socio-economically deprived areas at dental appointments. To overcome this barrier, various national oral health preventive strategies have been established to extend the reach to a broader audience, particularly within vulnerable communities, including socioeconomically disadvantaged groups, geographically isolated communities and children with disabilities. These strategies aim to ensure that oral health education and preventive care are accessible to all children, regardless of their socioeconomic status.

Recommendations for oral health prevention strategies involve more complex and systemic approaches to improving children's oral health. The emphasis is on creating an environment that supports and facilitates good oral health among children on a larger scale. In order to optimise the allocation of resources and achieve the most substantial improvements in dental health, these strategies should be prioritised according to their significant impact and feasibility.

8.5.1. Recommendations for currently implemented oral health prevention strategies

8.5.1.1. Recommendation 1. Enhance the "Toddler Smile" preventive programme by emphasising oral health educational components for parents and strengthening collaboration with MCH clinics

The “Toddler Smile” programme is a preventive dental initiative designed specifically for young children aged 6 months to 5 years, implemented in dental settings. It emphasises early preventive care and education to promote healthy oral hygiene habits from a young age, with the goal of improving child health outcomes by recognising oral health as essential to overall well-being [6].

It is recommended that the “Toddler Smile” programme be continued as it takes into account various factors significantly associated with caries experience among young children. The current educational components of the programme on breastfeeding, bottle-feeding, diet and oral hygiene practices can be slightly improved by aligning those mentioned in the UK’s “Delivering Better Oral Health for Children” guidelines [41]. The programme's initiatives could have a greater impact if the attendance rate of 6-month-old children in the programme were increased.

Actions by dental public health team:

- Enhance a direct and efficient communication channel between MCH clinics and dental professionals involved in the "Toddler Smile" programme. This can ensure that dental professionals receive timely updates on newborn registrations and can proactively reach out to parents to enroll their children in the programme

- Ensure that the educational components of the "Toddler Smile" programme are aligned with the infant feeding policies implemented by MCH clinics, as well as with the guidelines from the UK's "Delivering Better Oral Health for Children." This alignment can enhance the programme's credibility and effectiveness
- Encouraging collaborative co-production, which involves working closely with community members, stakeholders and families to co-design and implement programme activities
- Actively reaching out to families and strengthening engagement, the programme can encourage attendance through targeted awareness campaigns and partnerships that address specific local needs and reduce barriers to participation
- Monitor and evaluate the impact of the collaboration on the attendance rates of 6-month-old children in the "Toddler Smile" programme. Use the data collected to make necessary adjustments and to demonstrate the programme's value to both MCH clinics and parents

8.5.1.2. Recommendation 2. Collaborate with MCH clinics to strengthen breastfeeding policies by highlighting the importance of breastfeeding practices in controlling caries development

Collaboration between dental public health teams and MCH clinics is important for reinforcing breastfeeding policies and emphasising the significance of breastfeeding practices in the prevention of dental caries [38]. Dental public health team can advocate for the inclusion of oral health components in existing MCH policies and programmes.

Actions by dental public health team:

- Work with MCH policymakers to integrate oral health considerations into existing breastfeeding policies and programmes
- Provide training sessions for MCH staff on the oral health implications of breastfeeding and the importance of early oral health care. This can help MCH professionals to offer accurate advice to new mothers
- Share educational materials and resources with MCH clinics that highlight the benefits of breastfeeding for oral health and overall child development
- Collaborate with MCH clinics to monitor and evaluate the impact of integrated oral health and breastfeeding programmes on the incidence of dental caries in infants and young children

8.5.1.3. Recommendation 3. Integrate healthy food and drink policies in childhood settings with providing school incentives and involving parents

In Brunei Darussalam, healthy food and drink policies have been implemented in childhood settings for many years as a measure to enhance oral health among children [34]. This intervention complements the findings of the current study, which indicate that a high consumption of sugary drinks is associated with a higher prevalence and severity of caries experience. Although there is some evidence to support the effectiveness of these policies, there remains scope for enhancement to maximise their impact [83].

Actions by dental public health team:

- Offer incentives for schools that successfully implement and adhere to healthy food and drink policies. These incentives could include recognition awards, or support for extracurricular activities that promote health and wellness
- Raise parents' awareness on the importance of healthy eating habits and the role of diet in preventing dental caries through workshops, or informational sessions
- Develop educational programmes and interactive games for children that teach them about the benefits of healthy eating and the negative effects of consuming sugary drinks
- Implement a system to monitor the compliance with healthy food and drink policies and evaluate their impact on children's dietary habits and oral health outcomes. Use this data to make necessary adjustments and to demonstrate the policies' effectiveness to stakeholders

8.5.1.4. Recommendation 4. Integrate the targeted school fissure sealant programme with oral health education for parents in schools

The initiation of the fissure sealant programme in the primary schools of Brunei Darussalam in 2022 addresses a critical need, as revealed by this thesis, in which 59.0% of 5-year-olds in the country had experienced dental caries with a dmft of 3.63. The programme's integration could be more impactful by incorporating parent education sessions that discuss the benefits of the sealants and proper oral hygiene practices [84]. It can address the social gradient by providing knowledge that may be lacking in lower educational or income groups.

Actions by dental public health team:

- Work with school administrators to schedule parent-teacher meetings or workshops where dental health professionals can discuss the importance of fissure sealants in preventing dental caries and demonstrate proper brushing and educating the importance of proper diet
- Create informative brochures, videos and presentations in multiple languages to cater to the diverse backgrounds of the parents. These materials should be simple, visually appealing and include step-by-step guides for oral hygiene routines

8.5.1.5. Recommendation 5. Support the government in the ongoing implementation of a nationwide sugar tax

There is growing evidence to suggest that fiscal measures such as taxes on sugary products and subsidies for healthier alternatives can be effective in shaping consumer behaviour and improving public health outcomes [85, 86]. It is imperative that advocating for and supporting the strengthening of the implementation of a nationwide sugar tax, which has the potential to act as a significant deterrent against the overconsumption of sugar. Supporting the government in the ongoing implementation of a nationwide sugar tax is important.

Actions by dental public health team:

- Offer the latest research and data on the oral health effects of sugar consumption and the success of sugar taxes in other jurisdictions to support the policy's rationale and effectiveness
- Launch campaigns to educate the public about the health risks associated with the high frequency of sugar intake and the benefits of the sugar tax in promoting healthier lifestyles
- Establish a system to monitor the consumption of sugary products and the incidence of dental caries and other related health issues. Use this data to evaluate the impact of the sugar tax and to make evidence-based recommendations for policy adjustments
- Support efforts to ensure that the food and beverage industry complies with the tax regulations and advocate for transparent labeling of sugar content to empower consumers to make informed choices
- Advise that a portion of the revenue generated from the sugar tax initiative be allocated specifically to fund children's oral health improvement programmes

8.5.2. Recommendations for discontinued oral health prevention strategies

8.5.2.1. Recommendation 6. Support the government in reimplementing nationwide water fluoridation

As per evidence from different studies, water fluoridation has significantly reduced the incidence of dental caries [87-89]. In Brunei Darussalam, the fluoridation programme was implemented for many years, starting in 2009, but stopped in 2019. The programme aimed to supply fluoridated water to the entire population by maintaining optimal fluoride levels of 0.5 to 0.7 ppm in the water supply [87].

- Build a strong case for water fluoridation by educating the public, policymakers and stakeholders about the scientific evidence supporting its effectiveness in reducing dental caries. Address any misconceptions or concerns that may have led to the programme's discontinuation
- Work with government agencies to develop or reinstate policies that mandate the fluoridation of public water supplies
- Collaborate with water treatment facilities to implement the necessary technical adjustments to introduce fluoride into the water supply at the recommended concentrations
- Establish a robust system for ongoing monitoring of fluoride levels in the water supply to ensure they remain within the optimal range

8.5.2.2. Recommendation 7. Reimplement supervised toothbrushing programme in targeted schools where caries rates are high

The thesis's findings suggest that such programmes should be reintroduced, especially in targeted settings where tooth decay rates are high. An evaluation of the nationwide supervised toothbrushing programme in Scotland demonstrated significant reductions in the prevalence of caries experience among children and the economic impact of dental caries on healthcare facilities [90, 91]. The reimplementation of this programme could address this issue, ensuring that children are brushing effectively and regularly with fluoride toothpaste at home and in schools. The success of these programmes depends on engaging with parents and school staff [83].

Actions by dental public health team:

- Conduct workshops and informational sessions for parents and caregivers to educate them about the importance of fluoride toothpaste in preventing tooth decay
- Partner with schools to integrate oral health education into the curriculum and to provide fluoride toothpaste and toothbrushes for use at school. This can be part of a daily routine, supervised by teachers or school nurses
- Implement a system to monitor the usage of fluoride toothpaste and the impact on tooth decay rates among children. Use this data to adjust the programme as necessary and to demonstrate its effectiveness to stakeholders
- Advocate for sustained funding from government and private sources to ensure the long-term viability of the programme. This includes securing resources for supplies, personnel and educational materials

8.5.3. Recommendations for oral health prevention strategies that have not been put into practice

8.5.3.1. Recommendation 8. Support the government in introducing healthy vending machine policies in public settings

Brunei Darussalam has the opportunity to pioneer fiscal policies that promote oral health by controlling the availability of healthier food and drinks in public settings, such as vending machine policies in hospitals and leisure centres. While there is limited evidence on the use of fiscal policy specifically for oral health improvement measures, there is some indication of the effectiveness of increasing access to and availability of healthier foods [71].

Actions by dental public health team:

- Work with government agencies and policymakers to develop fiscal policies that incentivise the availability of healthier food and drinks in public settings. This could include tax breaks for vendors that offer nutritious options or levies on products high in sugar and unhealthy additives
- Collaborate with private sector entities, such as vending machine companies and food service providers, to ensure that healthier options are both available and appealing to consumers in public spaces
- Launch public education campaigns to raise awareness about the impact of diet on oral health. This can help shift consumer preferences towards healthier choices and support the success of fiscal policies aimed at improving oral health
- Establish mechanisms to monitor the implementation of fiscal policies and evaluate their impact on the availability of healthier options and ultimately, on oral health outcomes

8.5.3.2. Recommendation 9. Implement the provision of free toothbrushes and toothpaste to vulnerable communities via postal delivery or through health visitors

Targeted and timely provision of toothbrushes and toothpaste via postal delivery or through health visitors, to those in hard-to-reach populations or at a higher risk of caries, has some evidence of effectiveness, making the impact on inequities more favourable [83]. Such a strategy can be implemented in Brunei Darussalam.

Actions by dental public health team:

- Conduct oral health needs assessments to identify hard-to-reach populations and children at a higher risk of developing dental caries. This could involve collaborating with community leaders, healthcare providers and social services to pinpoint areas of need
- Work with postal services and health visitor programmes to create a reliable distribution network for delivering oral hygiene supplies
- Accompany the distribution of toothbrushes and toothpaste with educational materials that explain the importance of oral hygiene, proper diet and proper brushing techniques
- Implement a system for monitoring the distribution of supplies and following up with recipients to assess the impact of the intervention
- Seek funding from the dental department and non-profit organisations to support the ongoing costs of supply procurement and distribution

8.5.4. Recommendations for further research

8.5.4.1. Recommendation 10. Conduct a longitudinal cohort study to explore relationships between early-life behaviours and oral health outcomes

A longitudinal design is ideal for exploring causal relationships between early-life behaviours and later oral health outcomes. It will provide insights into the progression of oral health behaviours and caries development over time.

Actions by dental public health team:

- Design and secure funding for a cohort study involving children recruited from birth or early childhood
- Collect data on early-life behaviours, such as breastfeeding, bottle use and sugar exposure, along with regular clinical dental assessments
- Establish partnerships with healthcare providers and schools to facilitate recruitment and follow-up
- Develop a data management system for tracking longitudinal information

8.5.4.2. Recommendation 11. Conduct a study to assess behavioural and environmental interventions

Evaluate the long-term impact of specific interventions, including fluoride varnish application and oral health education for parents, to determine their effectiveness in preventing caries specific to the Brunei context.

Actions by dental public health team:

- Implement and monitor specific interventions, such as maternal oral health educational talks and fluoride varnish programmes, within the cohort
- Evaluate their effectiveness using comparative analysis, for example, intervention versus non-intervention groups
- Develop evidence-based guidelines for scaling up successful interventions nationwide

Table 8.1 Summary findings from Study 1, 2 and 3 and recommendations on oral health prevention strategies for relevant stakeholders in the Department of Dental Services in Brunei Darussalam

Findings from Study 1 & 2*	Findings from Study 3			Recommendations on preventive strategies based on the findings of all studies
Significant associations between caries experience and these oral health behaviours:	A good parental understanding	A mixed parental understanding	A poor parental understanding	
	on the associations between children’s oral health and their oral health behaviours in terms of:			
Breastfeeding practices	giving water to children after breastfeeding stopping breastfeeding at age 2			Dental public health team should: - enhance the preventive "Toddler Smile" programme by emphasising educational components for parents on breastfeeding and bottle-feeding practices to parents - collaborate with MCH clinics to strengthen breastfeeding policies by highlighting the importance of breastfeeding practices in controlling caries development
Bottle-feeding and other practices after breastfeeding (not explored in study 1 & 2)	using a feeder cup before age 1 to replace breastfeeding		stopping bottle-feeding at age 1	
Frequency of sugary drink intake per day	consuming water and plain milk		limiting the frequency of sugary beverages and food	
Frequency of sugary food intake per day (High frequency has a higher odds of caries experience but no significant association)	consuming nutritious foods such as fruits			

Age of started toothbrushing		starting brushing at a very early age		Dental public health team should: - enhance the preventive "Toddler Smile" programme by emphasising educational components for parents on oral hygiene practices - implement the provision of free toothbrushes and toothpaste to vulnerable communities via postal delivery or through health visitors - support the government in reimplementing nationwide water fluoridation - reimplement targeted supervised toothbrushing programmes in schools where caries rates are high - integrate the targeted-school fissure sealant programme with oral health education for parents in schools
Status of parental supervision at age 2 to 3	monitoring children's oral hygiene after toothbrushing		supervising children with toothbrushing until age 7	
Frequency of brushing per day at age 2 to 3	frequent toothbrushing per day brushing as the last thing at night starting from early childhood			
Amount of toothpaste used	using the correct amount of toothpaste			
Types of toothpaste used		using toothpaste with at least 1,000 ppm of fluoride		
Frequency of brushing per day at age 5	daily toothbrushing frequency and brushing for two minutes using a timer			
Age of started visiting dentists	preventive dental visits through participation in the “Toddler Smile” programme regular dental visits to reduce children's fear and anxiety about dental procedures			

**Studies 1 and 2 also found significant associations of caries experience in children with sociodemographic factors, including different ethnic backgrounds, parental education, household income of families and types of schools children attended*

Chapter 9

Conclusion

In conclusion, the findings of the thesis showed a significant decline in the prevalence of caries experience among 5-year-old children, with a reduction from 73.2% in 2015 to 59.0% in 2023. The mean dmft score also decreased from 5.12 to 3.63 over the same period. Considering that the surveys were conducted on two different groups of children, results on decreasing prevalence should be reported with caution. Although this improvement reflects positive trends in oral health outcomes for young children in the country, it is important to acknowledge the limitations inherent to the cross-sectional design of both studies. Cross-sectional studies provide a snapshot of data at a single point in time, which limits the ability to infer causal relationships or track individual-level changes over the study period.

The current thesis identified several key factors associated with caries experience in 5-year-old children. Sociodemographic factors such as children's school types, ethnic background, parental education level and household income contribute to caries experience among these children. Additionally, oral health behaviours including the age of stopping breastfeeding, frequency of daily SSB consumption, age of started toothbrushing, parental supervision during toothbrushing, frequency of daily brushing, type and quantity of toothpaste used, and the age of started dental visits were significantly associated with caries experience.

The thesis further investigated these associations and discovered that parent participants had misunderstandings of the associations between children's oral health and oral health behaviours (particularly, stopping bottle-feeding at age 1, restricting the frequency of sugary drinks and food and brushing teeth as the final routine at night commencing from early childhood).

These results indicated the importance of developing and implementing comprehensive public health strategies that address the complex nature of oral health inequalities. Such strategies should be designed to target the identified sociodemographic and behavioural factors to effectively enhance children's oral health.

(39,123 words)

Word count includes abstract and all chapters

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Appendices

Appendix 1. Search strategy used for the literature review

Embase

1. 'preschool child'/exp
2. (child* or preschool* or kindergarten* or 'nursery school*' or toddler* or juvenile*):ti,ab,kw
3. 1-2/OR
4. 'dental caries'/exp
5. (Caries or decay* or dmft or dmf or dmfs):ti,ab,kw
6. (Cavit* NEAR/3 (tooth or teeth)):ti,ab,kw
7. 5-6/OR
8. 'health behavior'/exp
9. (Health near/3 (behavior* OR behaviour*)):ti,ab,kw
10. 'tooth brushing'/exp
11. ((tooth or teeth) NEAR/3 brush*):ti,ab,kw
12. 'sugar intake'/exp
13. ((sugar* OR sweet*) NEAR/3 (juice* or drink* OR beverage* OR intake OR food*)):ti,ab,kw
14. ((dental OR dentist*) NEAR/3 (visit* OR attendance*)):ti,ab,kw
15. 8-14/OR
16. 7 AND 15
17. 'health promotion'/exp
18. (Health NEAR/3 promotion*):ti,ab,kw
19. 17-18/OR
20. 'dental health'/exp
21. ((Oral OR dental) NEAR/3 health):ti,ab,kw
22. 20-21/OR
23. #19 AND #22
24. #16 OR #23
25. #3 AND #24
26. #25 AND 'human'/de
27. #26 AND ('cohort analysis'/de OR 'cross sectional study'/de OR 'longitudinal study'/de OR 'meta analysis'/de OR 'randomized controlled trial'/de OR 'systematic review'/de) AND [preschool]/lim AND [2000-2024]/py AND [english]/lim

Results: 796

PubMed

1. "Child, Preschool"[Mesh]
2. child*[TIAB] or preschool*[TIAB] or kindergarten*[Tiab] or "nursery school*" [TIAB] or toddler*[TIAB] or juvenile*[TIAB]
3. #1 OR #2
4. "Dental Caries"[Mesh]
5. Caries[TIAB] or decay*[TIAB] or dmft[TIAB] or dmf[TIAB] or dmfs[TIAB]
6. "cavity tooth"[TIAB:~3]
7. "cavity teeth"[TIAB:~3]
8. "cavities tooth"[TIAB:~3]
9. "cavities teeth"[TIAB:~3]
10. #4 OR #5 OR #6 OR #7 OR #8 OR #9
11. "Health Behavior"[Mesh]
12. "health behavior"[TIAB:~3]
13. "health behaviour"[TIAB:~3]
14. "health behaviors"[TIAB:~3]
15. "health behaviours"[TIAB:~3]
16. "Toothbrushing"[Mesh]
17. "toothbrushing"[TIAB]
18. "tooth brushing"[TIAB:~3]
19. "teeth brushing"[TIAB:~3]
20. "Dietary Sucrose"[Mesh]
21. Sugar*[TIAB] OR sweet*[TIAB]
22. "dental visit"[TIAB:~3]
23. "dentist visit"[TIAB:~3]
24. "dental attendance"[TIAB:~3]
25. "dentist attendance"[TIAB:~3]
26. #11 OR #12 OR #13 OR #14 OR #15 OR 16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25
27. #10 AND #26
28. "Health Promotion"[Mesh]
29. "health promotion"[TIAB:~3]
30. #28 OR #29
31. "Oral Health"[Mesh]
32. "Oral health"[TIAB:~3]
33. "dental health"[TIAB:~3]
34. #31 OR #32 OR #33
35. #27 AND #34
36. #27 OR #35
37. #36 AND #3

Limited to filters: Preschool Child: 2-5 years, English, from 2000/1/1 - 2024/6/30

Search 1

Additional filters for: Meta-Analysis, Randomized Controlled Trial, Systematic Review,

Results: 187

Search 2:

Combined with search term Cohort OR "cross sectional" OR longitudinal

Results: 660

Total results: 1,643

De-duplicated results: 1,088

Appendix 2. Participant information leaflet, consent form and questionnaire for the 2015 CNOHS



KAJISELIDIK KESIHATAN MULUT KEBANGSAAN 2015-2017
NEGARA BRUNEI DARUSSALAM
(KAJISELIDIK KANAK-KANAK)
BRUNEI DARUSSALAM
NATIONAL ORAL HEALTH SURVEY 2015-2017
(CHILD SURVEY)

Ibu/Bapa/Penjaga,

Dengan hormat sukacita kami memohon kerjasama awda. Sepertimana yang telah diterangkan di dalam surat yang dilampirkan, kami ingin mendapatkan maklumat tentang kesihatan mulut anak biskita sebagai sebahagian dari Kajiselidik Kesihatan Mulut Kebangsaan, Negara Brunei Darussalam 2015-2017. Jika awda membenarkan anak biskita untuk menyertai Kajiselidik ini, sila isikan borang kajiselidik seterusnya. Semua maklumat yang awda berikan adalah **sulit**.

Dear Parent/Guardian,

We would like your help. As explained in the attached letter, we hope to collect information about your child's oral health as part of the Brunei Darussalam National Oral Health Survey 2015-2017. If you agree to your child's participation, please fill in the following questionnaire. All information you provide will be **strictly confidential**.

BORANG KEBENARAN/ CONSENT FORM**NAMA ANAK/ CHILD'S NAME:**

.....

ALAMAT/ ADDRESS:

.....

.....

DAERAH/ DISTRICT:**ALAMAT E-MEL IBU/ BAPA/ PENJAGA/ PARENT'S/ GUARDIAN'S EMAIL:**

.....

NOMBOR TELEFON RUMAH/ BIMBIT IBU/ BAPA/ PENJAGA:**PARENT'S/ GUARDIAN'S HOME/ MOBILE PHONE NUMBER:****SEKOLAH/ SCHOOL:****PERINGKAT TAHUN/ YEAR LEVEL:****TARIKH LAHIR/ DATE OF BIRTH**/...../.....

Saya, (sila tulis nama penuh awda dengan huruf besar).....
telah membaca lampiran maklumat, dan bersetuju memberi maklumat bagi Kajiselidik Kesihatan Mulut
Kebangsaan 2015-2017 (Kajiselidik Kanak-Kanak). Saya telah berbincang tentang penyertaan ini dengan
anak saya.

I, (please print your name in full)
have read the accompanying information sheet and consent to provide information for the National Oral
Health Survey 2015-2017 (Child Survey). I have discussed this matter with my child.

Dengan memberi kebenaran ini, saya faham bahawa:

- Saya boleh menarik balik kebenaran saya ini pada bila-bila masa, dan ianya tidak akan menjejaskan pengurusan penjagaan kesihatan mulut anak saya pada masa ini atau di masa akan datang;
- Kajiselidik ini adalah bagi tujuan penyelidikan yang direka bagi meningkatkan kesihatan mulut kanak-kanak di Negara Brunei Darussalam, dan tidak semestinya memberi manfaat kepada anak saya secara langsung;
- Maklumat sulit yang saya berikan untuk kajian ini akan terpelihara; dan
- Maklumat yang dikumpul akan digunakan untuk penyelidikan dan terbitan pada MASA AKAN DATANG.
- Saya faham bahawa penyertaan termasuk melengkapkan borang kajiselidik ini dan juga pemeriksaan pergigian anak saya di sekolahnya oleh doktor atau jururawat pergigian yang terlatih.

- f) Saya faham bahawa saya akan menerima nasihat umum mengenai kesihatan mulut anak saya selepas pemeriksaan pergigian dan saya akan dimaklumkan jika ada isu-isu utama yang menjejaskan kesihatan mulut anak saya yang memerlukan penilaian atau rawatan lanjut.
- g) Saya faham bahawa saya mungkin akan dihubungi lagi oleh Pasukan Petugas Kajiselidik, jika perlu, untuk menjelaskan maklumat, ataupun jawapan-jawapan yang saya berikan dalam borang kajiselidik.
- h) Kebenaran saya diberi secara sukarela.
- i) Saya tahu yang saya boleh menyimpan satu salinan Borang Kebenaran ini, setelah diisi, dan juga lampiran maklumat yang diberi.

In giving my consent, I understand that:

- a) I am free to withdraw my consent at any time, and this will not affect the management of my child's oral health care, now or in the future;
- b) The study is for the purpose of research which, although designed to improve the oral health of children in Brunei Darussalam, may not directly benefit my child;
- c) The confidentiality of information that I provide for the study will be safeguarded; and
- d) The information collected will be used for FUTURE research and publications.
- e) I understand that participation includes the completion of this questionnaire and a dental inspection of my child at his/her school by a trained dentist or dental nurse.
- f) I understand that I will receive general advice about my child's oral health following the dental inspection and will be advised if any significant issues affecting my child's oral health need further assessment or care.
- g) I understand that I may be contacted by the Survey Taskforce again, if needed for the purpose of clarifying any details or responses provided in the questionnaire.
- h) My consent is given freely.
- i) I am aware that I can retain a copy of this Consent form, when completed, and the attached Information sheet.

Tandatangan Ibu/ Bapa/ Penjaga:

Parent's/ Guardian's Signature:

Tarikh/ Date:

Jika awda memberi kebenaran, sila lengkapkan Sejarah Perubatan di mukasurat seterusnya.
If you have consented, please complete the **Medical History** in the next page.

UNTUK KEGUNAAN PEJABAT/ OFFICE USE ONLY
Semua keterangan mesti lengkap/ All details must be completed

School
Code:

Return
Date:

/	/	
day	month	year

ID:

TERIMA KASIH DI ATAS KEBENARAN AWDA DALAM MENYERTAI KAJISELIDIK INI
THANK YOU FOR CONSENTING TO PARTICIPATE IN THE SURVEY

Untuk memastikan pemeriksa pergigian sedia maklum dengan keadaan atau sebarang masalah perubatan anak biskita semasa menjalani pemeriksaan mulut, diharap kerjasama biskita untuk menjawab beberapa soalan mengenai sejarah perubatan anak biskita.

To ensure the dental examiner will be aware of any medical or other conditions at the time of the dental inspection, it would be appreciated if you could complete a few questions regarding your child's medical history.

ADAKAH ANAK BISKITA SEDANG ATAU PERNAH MENGHIDAP MASALAH PERUBATAN YANG TERSENARAI DI BAWAH? (Sila tandakan 'Ya' atau 'Tidak' bagi setiap masalah)
DOES YOUR CHILD HAVE OR EVER HAD ANY OF THE MEDICAL PROBLEMS LISTED BELOW? (Please tick 'Yes' or 'No' for each problem)

	Ya/ Yes	Tidak/ No		Ya/ Yes	Tidak/ No
Masalah jantung, penyakit injap seperti 'murmur'			Epilepsi (sawan)		
Heart complaint, valve disorder, eg: murmur	☐	☐	Epilepsy, fits, convulsions	☐	☐
Tuberkulosis/ Tiba/ Batuk kering			Asma (ampus), sesak nafas		
Tuberculosis (TB)	☐	☐	Asthma, breathlessness	☐	☐
Tekanan darah tinggi			Kencing manis		
Hypertension (high blood pressure)	☐	☐	Diabetes	☐	☐
Anemia (kurang darah) atau penyakit darah yang lain Anaemia, or other blood diseases	☐	☐	Kecelaruhan mental		
			Mental disorders	☐	☐

Sila senaraikan sebarang masalah perubatan/ penyakit yang lain:
 Please list any other medical problem/ disease:

Sila senaraikan sebarang ubat yang diberi oleh doktor yang diambil atau digunakan oleh anak biskita pada masa ini:
 Please list any medicines, prescribed by a doctor, your child is taking or using at present:

Sila senaraikan sebarang ubat yang menyebabkan alahan pada anak biskita:
 Please list any drugs or medicines your child is allergic to:

Sila senaraikan alahan-alahan lain (termasuk getah lateks)
 Please list any other allergies (including latex):

Tandatangan (Ibu/ Bapa/ Penjaga)

Signature (Parent / Legal Guardian): _____

Tarikh/ Date ____/____/____

SILA BACA SEBELUM MENJAWAB SOALAN KAJISELIDIK PLEASE READ BEFORE ANSWERING THE QUESTIONNAIRE

- Semua soalan di dalam borang kajiselidik ini yang merujuk kepada 'anak biskita' adalah mengenai anak yang dinamakan di dalam Borang Kebenaran di muka hadapan buku kajiselidik ini.
All of the questions in the questionnaire that refer to 'your child' concern the child named on the Consent Form at the front of this booklet.
- Semua jawapan awda adalah sangat dihargai dan tolong lengkapkan kesemua soalan dengan sebaik-baik pengetahuan awda. Jika awda kurang pasti mengenai sesetengah soalan, sila hubungi Urusetia, Pasukan Petugas Kajiselidik, Jabatan Perkhidmatan Pergigian di **2380413/ 435/ 434/ 433/ 426 samb.139** (semasa waktu bertugas) atau melalui e-mel di **bruneinohs@gmail.com**
All of your answers are greatly appreciated, so please complete all questions to the best of your knowledge. If you are uncertain about a question, please contact Secretariat, Survey Taskforce, Department of Dental Services at 2380413/ 435/ 434/ 433/ 426 ext.139 (during office hours) or via email at bruneinohs@gmail.com for advice.
- Nombor-nombor kecil di sebelah petak-petak jawapan adalah untuk kegunaan pejabat sahaja.
The small numbers next to the tick boxes are for office use only.

CONTOH-CONTOH SOALAN/ EXAMPLES OF QUESTIONS

- Setiap soalan disediakan dengan panduan cara menjawab. Panduan-panduan ini ditulis dalam *italik*.
There will always be instructions next to the question telling you how to answer. These instructions will be written in italic.
- Pernakah anak biskita menggunakan ubat kumur-kumur berfluorida? (Tandakan satu petak sahaja)
Has your child ever used fluoride mouthrinse? (Tick one box only)

☒ ₁	Ya/ Yes
☐ ₂	Tidak/ No
☐ ₃	Tidak tahu/ Don't know
- Apakah jenis rawatan yang pernah anak biskita jalani? (Tandakan sebanyak petak yang berkenaan)
What type of treatment has your child had? (Tick as many boxes as applicable)

☒ ₁	Cabutan gigi/ Dental extractions
☒ ₂	Tampalan/ Fillings
☐ ₃	Penggilapan/ Polishing
☒ ₄	Pemeriksaan pergigian/ Dental examination

- Anak dalam contoh ini memberus giginya **kurang dari sekali dalam sehari semasa berumur 2-3 tahun dan sekarang memberus sekali dalam sehari.**
The child in this example brushed his/ her teeth **less than once a day at age 2-3 and once a day now.**

Sila tandakan satu petak sahaja bagi setiap peringkat umur anak biskita.
Please tick one box only for each time period in your child's life.

	PADA UMUR 2-3 TAHUN AT AGE 2-3	SEKARANG NOW
a) Berapa kerapkah anak biskita memberus giginya dengan ubat gigi? How often did/ does your child brush his/ her teeth with toothpaste?	☒ ₁ Kurang dari sekali dalam sehari/ Less than once a day ☐ ₂ Sekali dalam sehari Once a day ☐ ₃ Dua kali sehari Twice a day ☐ ₄ Lebih dari dua kali sehari More than twice a day	☐ ₁ Kurang dari sekali dalam sehari Less than once a day ☒ ₂ Sekali dalam sehari Once a day ☐ ₃ Dua kali sehari Twice a day ☐ ₄ Lebih dari dua kali sehari More than twice a day

- Berapakah umur anak biskita bila dia mula mengambil ubat tablet atau titik fluorida?
(Tuliskan umur atau '0' jika sejak lahir)

At what age did your child start taking fluoride tablets or drops?
(Write age or '0' if used since birth)

2
6

 Tahun/ Years Bulan/ Months

- Soalan-soalan dijangkakan mengambil masa kira-kira 20 minit untuk dilengkapkan.

The questions should take you around 20 minutes to complete.

**SILA MULAKAN SOALAN KAJISELIDIK DI MUKASURAT SETERUSNYA:
PLEASE START THE QUESTIONNAIRE ON THE FOLLOWING PAGE:**

Amalan Pergigian/ Dental Practices

Soalan-soalan seterusnya adalah mengenai amalan penjagaan kesihatan mulut dan penggunaan suplemen fluorida.

The following questions ask about oral health care behaviours and use of fluoride supplements.

- 1** Pada usia berapakah awda mula membersihkan gigi anak biskita tanpa ubat gigi?
Membersihkan gigi termasuk menggosok dengan kain atau berus gigi. (Tulis umur atau pilih "Tidak pernah")
At what age did you start cleaning your child's teeth without toothpaste?
Tooth cleaning includes wiping with a cloth or a toothbrush. (Write age or select "Never")

..... TAHUN/ Years BULAN/ Months **ATAU** ☐ **Tidak pernah membersihkan gigi tanpa ubat gigi**
OR Never cleaned teeth without toothpaste

- 2** Pada usia berapakah awda mula membersihkan gigi anak biskita dengan ubat gigi?
(Tulis umur atau pilih "Tidak pernah")
At what age did you start cleaning your child's teeth with toothpaste?
(Write age or select "Never")

..... TAHUN/ Years BULAN/ Months **ATAU** ☐ **Tidak pernah memberus dengan ubat gigi**
OR Never brushed with toothpaste
→ **TERUS KE SOALAN 4**
→ **GO TO QUESTION 4**

- 3** Untuk soalan-soalan seterusnya, sila tandakan satu petak sahaja bagi setiap peringkat umur anak biskita.
For the following questions, please tick one box only for each time period in your child's life.

	PADA UMUR 2 – 3 TAHUN AT AGE 2-3 YEARS	SEKARANG NOW
a) Berapa kerapkah anak biskita memberus giginya dengan ubat gigi? How often did/ does your child brush his/her teeth with toothpaste?	☐ Kurang dari sekali dalam sehari/ Less than once a day ☐ Sekali sehari/ Once a day ☐ Dua kali sehari/ Twice a day ☐ Lebih dari dua kali sehari/ More than twice a day	☐ Kurang dari sekali dalam sehari/ Less than once a day ☐ Sekali sehari/ Once a day ☐ Dua kali sehari/ Twice a day ☐ Lebih dari dua kali sehari/ More than twice a day
b) Apakah jenis ubat gigi yang digunakan oleh anak biskita? What type of toothpaste did/ does your child use?	☐ Ubat gigi berfluorida yang biasa/ Standard fluoride toothpaste ☐ Ubat gigi kanak-kanak/ Children's toothpaste ☐ Ubat gigi tidak berfluorida/ Non-fluoride toothpaste ☐ Tidak tahu/kurang pasti/ Don't know/not sure	☐ Ubat gigi berfluorida yang biasa/ Standard fluoride toothpaste ☐ Ubat gigi kanak-kanak/ Children's toothpaste ☐ Ubat gigi tidak berfluorida/ Non-fluoride toothpaste ☐ Tidak tahu/ kurang pasti/ Don't know/not sure
c) Pernahkah awda mendapati anak biskita memakan atau menjilat ubat gigi? Have you noticed your child eating or licking toothpaste?	☐ Sering/ Often ☐ Kadang-kadang/ Sometimes ☐ Tidak pernah/ Never	☐ Sering/ Often ☐ Kadang-kadang/ Sometimes ☐ Tidak pernah/ Never

	PADA UMUR 2 – 3 TAHUN AT AGE 2 - 3 YEARS	SEKARANG NOW
d) Berapa banyakkah ubat gigi yang selalu anak biskita (atau awda) gunakan pada berus giginya? How much toothpaste did/does your child (or do you) usually use on his/ her toothbrush?	☐  ☐  ☐ 	☐  ☐  ☐ 
e) Selepas memberus gigi, anak biskita selalu.... After tooth brushing did/does your child usually...	☐ Menelan sahaja/ Just swallow ☐ Berkumur dan menelan/ Rinse and swallow ☐ Berkumur dan meludah/ Rinse and spit ☐ Meludah sahaja/ Just spit	☐ Menelan sahaja/ Just swallow ☐ Berkumur dan menelan/ Rinse and swallow ☐ Berkumur dan meludah/ Rinse and spit ☐ Meludah sahaja/ Just spit
f) Bagaimana biasanya cara awda membantu anak biskita memberus gigi? How did/ do you usually assist your child to brush his/ her teeth?	☐ Mencilit ubat gigi pada berus gigi dan memberus giginya/ Applied toothpaste on toothbrush & brush his/ her teeth ☐ Hanya meletakkan ubat gigi pada berus gigi/ Only applied toothpaste on toothbrush ☐ Memerhatikan dan menasihati/ Watched and gave advice ☐ Tidak membantu memberus gigi/ Did not help brush ☐ Cara lain (sila terangkan)/ Other methods (please specify)	☐ Mencilit ubat gigi pada berus gigi dan memberus giginya/ Applied toothpaste on toothbrush & brush his/ her teeth ☐ Hanya meletakkan ubat gigi pada berus gigi/ Only applied toothpaste on toothbrush ☐ Memerhatikan dan menasihati/ Watched and gave advice ☐ Tidak membantu memberus gigi/ Did not help brush ☐ Cara lain (sila terangkan)/ Other methods (please specify)

4 Pernahkah anak biskita menggunakan ubat kumur-kumur berfluorida?
(Sila tandakan satu petak sahaja)
Has your child ever used fluoride mouthrinse?
(Tick one box only)

Sila ambil maklum bahawa bukan semua ubat kumur-kumur mengandungi fluorida. Jika boleh, sila periksa kandungan bahan-bahan yang disenaraikan pada botolnya.
Please take note that not all mouthrinses contain fluoride. If possible, check the ingredients on the bottle.

☐ Ya/ Yes
☐ Tidak/ No
☐ Tidak tahu/ Don't know

TERUS KE SOALAN 9/ GO TO QUESTION 9
TERUS KE SOALAN 9/ GO TO QUESTION 9

Note: Only a few pages of the questionnaire are showed here. For detailed questionnaire, refer to

[https://www.moh.gov.bn/Shared%20Documents/DOWNLOADS/National%20Oral%20Health%20Survey%202014-2017%20\(Adult%20Phase\).pdf](https://www.moh.gov.bn/Shared%20Documents/DOWNLOADS/National%20Oral%20Health%20Survey%202014-2017%20(Adult%20Phase).pdf) [1]

Appendix 3. ZINB regression model to assess the associations of each early-life health behaviour with the severity of caries experience in young children and then adjusting for sex, ethnicity, school type, parental education and household income sequentially

IRR/ OR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Age of start brushing (n = 242)						
Negative binomial portion (Count model)						
6 months and below (ref)						
6 to 12 months	1.24 (0.96, 1.59), p=0.094	1.25 (0.97, 1.61), p=0.079	1.24 (0.97, 1.60), p=0.090	1.22 (0.94, 1.59), p=0.134	1.14 (0.86, 1.52), p=0.368	1.14 (0.85, 1.53), p=0.390
12 to 24 months	1.06 (0.78, 1.44), p=0.705	1.03 (0.76, 1.40), p=0.837	1.03 (0.76, 1.39), p=0.873	1.03 (0.74, 1.43), p=0.861	0.98 (0.71, 1.37), p=0.922	1.03 (0.72, 1.47), p=0.861
24 months and above	1.11 (0.70, 1.76), p=0.653	1.17 (0.74, 1.85), p=0.505	1.18 (0.75, 1.87), p=0.478	1.20 (0.75, 1.91), p=0.440	0.88 (0.51, 1.52), p=0.649	0.92 (0.53, 1.59), p=0.765
Zero-inflated portion (Caries-free model)						
6 months and below (ref)						
6 to 12 months	1.18 (0.58, 2.40), p=0.651	1.21 (0.58, 2.54), p=0.612	1.22 (0.57, 2.61), p=0.609	1.21 (0.56, 2.65), p=0.628	1.56 (0.62, 3.90), p=0.343	1.54 (0.60, 3.97), p=0.373
12 to 24 months	0.23 (0.04, 1.18), p=0.077	0.20 (0.04, 1.11), p=0.066	0.12 (0.01, 1.22), p=0.073	0.14 (0.01, 1.52), p=0.107	0.00 (0.00, N/A), p=0.997	0.00 (0.00, N/A), p=0.997
24 months and above	1.35 (0.37, 4.92), p=0.652	0.92 (0.22, 3.92), p=0.910	1.15 (0.26, 5.04), p=0.856	1.20 (0.26, 5.41), p=0.816	1.67 (0.29, 9.80), p=0.568	1.57 (0.26, 9.51), p=0.622
Frequency of brushing per day at age 2-3 (n = 252)						
Negative binomial portion (Count model)						
Less than twice (ref)						
Twice and more	0.98 (0.79, 1.22), p=0.862	0.96 (0.77, 1.20), p=0.698	0.94 (0.75, 1.18), p=0.595	0.92 (0.74, 1.16), p=0.494	0.89 (0.70, 1.14), p=0.344	0.88 (0.69, 1.13), p=0.313
Zero-inflated portion (Caries-free model)						
Less than twice (ref)						
Twice and more	2.60 (1.19, 5.70), p=0.017	3.10 (1.34, 7.21), p=0.008	3.28 (1.39, 7.76), p=0.007	3.81 (1.54, 9.43), p=0.004	4.26 (1.50, 12.13), p=0.007	4.89 (1.65, 14.51), p=0.004
Toothbrushing supervision at age 2-3 (n = 252)						
Negative binomial portion (Count model)						
Children (ref)						
Adult supervision	0.90 (0.62, 1.31), p=0.585	0.78 (0.53, 1.14), p=0.205	0.76 (0.52, 1.12), p=0.160	0.72 (0.48, 1.06), p=0.099	0.74 (0.47, 1.16), p=0.187	0.69 (0.43, 1.10), p=0.116
Zero-inflated portion (Caries-free model)						
Children (ref)						
Adult supervision	0.55 (0.20, 1.51), p=0.242	0.47 (0.16, 1.38), p=0.169	0.36 (0.11, 1.20), p=0.098	0.45 (0.13, 1.49), p=0.190	0.12 (0.02, 0.63), p=0.012	0.19 (0.04, 1.06), p=0.058

Age of stopping breastfeeding (n =247)						
Negative binomial portion (Count model)						
24 months or more (ref)						
Between 12 and 24 months	0.86 (0.62, 1.19), p=0.362	0.81 (0.59, 1.12), p=0.202	0.81 (0.58, 1.11), p=0.186	0.77 (0.55, 1.07), p=0.121	0.92 (0.64, 1.33), p=0.661	0.86 (0.59, 1.26), p=0.447
12 months and below	0.89 (0.70, 1.13), p=0.347	0.85 (0.66, 1.09), p=0.195	0.85 (0.66, 1.10), p=0.221	0.84 (0.64, 1.10), p=0.195	0.90 (0.67, 1.22), p=0.507	0.91 (0.68, 1.23), p=0.549
Zero-inflated portion (Caries-free model)						
24 months or more (ref)						
Between 12 and 24 months	1.29 (0.52, 3.15), p=0.584	1.36 (0.54, 3.42), p=0.515	1.43 (0.55, 3.71), p=0.459	1.54 (0.56, 4.23), p=0.397	0.90 (0.29, 2.82), p=0.856	1.03 (0.31, 3.46), p=0.961
12 months and below	0.71 (0.32, 1.59), p=0.409	0.77 (0.34, 1.75), p=0.530	0.90 (0.37, 2.19), p=0.813	1.10 (0.43, 2.83), p=0.841	0.73 (0.23, 2.28), p=0.585	0.95 (0.31, 2.95), p=0.928
Age of first dental visit (n = 255)						
Negative binomial portion (Count model)						
Below 12 months (ref)						
12 months and above + never	1.56 (0.96, 2.53), p=0.074	1.49 (0.85, 2.60), p=0.162	1.48 (0.84, 2.59), p=0.170	1.37 (0.76, 2.45), p=0.290	1.44 (0.80, 2.60), p=0.224	1.37 (0.71, 2.63), p=0.350
Never visit	0.91 (0.53, 1.54), p=0.716	0.87 (0.48, 1.57), p=0.638	0.86 (0.47, 1.57), p=0.627	0.84 (0.45, 1.56), p=0.580	0.86 (0.46, 1.62), p=0.651	0.86 (0.43, 1.71), p=0.671
Zero-inflated portion (Caries-free model)						
Below 12 months (ref)						
12 months and above + never	0.49 (0.14, 1.70), p=0.259	0.33 (0.09, 1.24), p=0.100	0.31 (0.07, 1.37), p=0.123	0.27 (0.06, 1.17), p=0.081	0.46 (0.07, 3.15), p=0.426	0.42 (0.05, 3.39), p=0.418
Never visit	1.23 (0.33, 4.58), p=0.761	0.80 (0.20, 3.23), p=0.752	0.80 (0.17, 3.88), p=0.785	0.78 (0.17, 3.66), p=0.753	1.48 (0.19, 11.29), p=0.705	1.48 (0.16, 13.62), p=0.730

Model 1: unadjusted; Model 2: adjusted for sex and ethnicity; Model 3: adjusted for sex, ethnicity and school type; Model 4a: adjusted for sex, ethnicity, school type and parental education; Model 4b: adjusted for sex, ethnicity, school type and household income; Model 5: Fully adjusted

Appendix 4. Stages for the sampling strategy for oral health survey for 5-year-olds

Stage 1: Listing all schools

In this first stage, the principal investigator will:

- Contact the Ministry of Health in Brunei Darussalam and ask for information about numbers of 5-year-old children on the roll for each kindergarten and primary schools in Brunei-Muara district
- List all schools with numbers of children in reception year (becoming 5-years-old) plus year 1 (becoming 6-years-old) in a table form in an excel spreadsheet
- Divide the total number of children in reception year by 2 to estimate the number of 5-year-olds. Round 0.5 to the nearest even number, for example $20.5 = 20$, $23.5 = 24$.

Stage 2: Stratification by size of school

In this stratification stage, the following steps will be carried out:

- Sort the table in ascending order on the calculated 'Expected number of 5-year-olds' column
- Colour the rows according to the school size groups as follows:
 - Small school (in green) = 1 to 15 5-year-olds
 - Medium school (in blue) = 16 to 49 5-year-olds
 - Large school (in orange) = more than 50 5-year-olds
- Start to create the sampling frame table and to complete columns A and

School size	A Total number of schools	B Number of 5-year-olds attending school from expected calculation	C Proportion of 5-year-old population attending schools (rounded)	D Target number of children to randomly sample from each school size for main sample
Small (1-15)	4	$10+11+13+14$ $= 48$		
Medium (16-49)	6	$24+25+28+30+47+48$ $= 202$		
Large (50+)	23	$50+.....+93$ $= 1,444$		
Total	33	1,694		

- Calculate the proportion attending schools for each size group in column C. This allows calculation of the correct proportions of the main sample.

School size	A Total number of schools	B Number of 5- year-olds attending school from expected calculation	C Proportion of 5-year- old population attending schools (rounded)	D Target number of children to randomly sample from each school size for main sample
Small (1-15)	4	48	$(48 \div 1694) \times 100$ = 3%	
Medium (16-49)	6	202	$(202 \div 1694) \times 100$ = 12%	
Large (50+)	23	1,444	$(1444 \div 1694) \times 100$ = 85%	
Total	33	1,694		

- Refer to local previous survey response rates when selecting a target sample size. For example, a target sample size of 420 with a previous 60% response rate would give 252 children examined.
- Apply the proportions in column C to the target sample size you have decided to use for the main sample and calculate in column D how many children in each school size group need to be randomly sampled.

School size	A Total number of schools	B Number of 5- year-olds attending school from expected calculation	C Proportion of 5-year-old population attending schools (rounded)	D Target number of children to randomly sample from each school size for main sample
Small (1-15)	4	48	3%	$420 \times 3\% =$ $420 \times 0.03 = 13$
Medium (16-49)	6	202	12%	$420 \times 12\% =$ $420 \times 0.12 = 50$
Large (50+)	23	1,444	85%	$420 \times 85\% =$ $420 \times 0.85 = 357$
Total	33	1,694		420

Stage 3: Sampling of the schools

In this next stage, the principal investigator will:

- Allocate every school a number starting at 1 within each school size group
- Use a random number generator to sample schools in a random order.
- Record the order in which the schools were sampled. The two previously-mentioned bullet points will be repeated for each size group
- Complete columns E and F in the sampling table

School size	A Total number schools	B Number of 5-year-olds attending school	C Proportion of 5-year-old population	D Target number of children to randomly sample for main sample	E Number of schools selected	F Number of children sampled
Small (1-15)	4	48	3%	13	1	13
Medium (16-49)	6	202	12%	50	3	50
Large (50+)	23	1,444	85%	357	23	358
Total	33	1,694		420	27	421

Stage 4: Sampling the children

Once sampling tables have been checked and verified by the Director of Dental Department in Brunei, the schools can be contacted and children sampled. The following will be done by the principal investigator:

- Each sampled school should be contacted to ask if they will help with the survey and agree a date of examination.
- If a school refuses, then a substitute can be used. Use substitute schools in the order in which they were randomly sampled. This is the reason for listing the order of selection for all schools and selecting some spares.
- Obtain the reception and year 1 class lists from the schools.
- Working from the class lists use the dates of birth to identify children who will have reached their fifth, but not their sixth birthday on the planned day of examination. In the protocol there is an appendix to help with this.
- In small schools all age eligible children will be included and asked for agreement to participate, in which the schools will fill in the tracking list for schools to record which children have returned agreement to participate forms
- In the medium and large sized schools use the agreed sampling intensities to select from the age-eligible children.
- All sampled children should be asked for agreement to participate and a second request made for those who do not respond to the first. Every effort should be made to increase response rates in line with the guidance in the protocol.
- All children with agreement to participate should be examined if they are present at school and are willing to cooperate.
- Child substitution should not be used.
- Children sampled in this way should be entered as '0 – Main sample'

Appendix 5. Permission from the Director of the Department of Dental Services

Tel. : 2380426 / 2380433 Faks : 2380422 E-mail : denhealth@brunet.bn		جباتن فرخدماتن فرکیکیان JABATAN PERKHIDMATAN PERGIGIAN PUSAT PERGIGIAN NEGARA, JALAN LAPANGAN TERBANG LAMA, BERAKAS BB3510, NEGARA BRUNEI DARUSSALAM.

Our reference: PERGIGIAN/PPN/1105/2010/00-296382 (k) Date: 22 March 2023
29 Sya'aban 1444

To
Dr. Haji Majidi bin Haji Awang Bakar
Dental Officer
Department of Dental Services
Ministry of Health
Negara Brunei Darussalam

Dear Doctor Haji,

RE: REQUEST FOR PERMISSION TO INVOLVE STAFF AND FACILITIES FOR RESEARCH ACTIVITIES

With reference to your letter dated 13 March 2023 regarding the above matter.

As part of your postgraduate research entitled *"Associations between early-life behaviours, contemporary oral health behaviours and oral health amongst children in Brunei Darussalam and the implications of these for future oral health strategy and dental health policy"*, to be conducted from 01/06/2023 to 31/07/2023 (subject to change), I have no objection for you to involve the staff, equipment and facilities of the Dental Department as mentioned in your letter and listed below:

1. Staff of Department of Dental Services
 - Dr. Haji Amirul Rizan bin Haji Mohamad – Clinical Supervisor
 - Jafar bin Jamil – Dental Examiner 2
 - Dk Siti Nurul Aimi Zairah binti Pg Lutfi – Dental Recorder 1
 - Syahnurul Fadzillah binti Pehin Dato Haji Abdu'r Rahmani – Dental Recorder 2
 - Md Zulhafiy bin Md Yusran – Dental Helper
 - Malinah binti Samat – Administration and transcriber for interview transcripts
 - Dr. Melvin Lim Ya Wei – Interviewer for chineses participants in interview session
2. Equipment and materials
 - Portobale dental chairs – 2 units
 - Portable lights – 2 units
 - Portable 3-in-1 machines – 2 units
 - Head lights – 2 units
 - OHP stickers

3. Facilities

- A room in National Dental Centre to host lectures on dental calibration training and interview sessions for selected parents

4. Use of the questionnaire and anonymised data from NOHS Child survey for secondary analysis and to follow the existing rules and requirements of the Medical and Health Research Ethics Committee (MHREC).

Thank you.

"Together Towards a Healthy Nation"
'Puasa Mendidik Jiwa Bertakwa'



(DOCTOR KOK EI CHUEN)

Acting Director
Department of Dental Services

cc.

Director General of Medical and Health Services

Chief Dental Officer, Department of Dental Services

Head of Dental Public Health, Department of Dental Services

Personal file

Appendix 6. Permission letter from the Deputy Permanent Secretary of the Ministry of Health (Malay version)

Telex : KK BU 2421
Telegrams : MINHEALTH
BRUNEI
Telephone : 2381640
Fax : 2381440



كمنتريين كصحتن
KEMENTERIAN KESIHATAN
MINISTRY OF HEALTH
JALAN MENTERI BESAR BB3910
BANDAR SERI BEGAWAN
NEGARA BRUNEI DARUSSALAM

Rujukan Kami:
Our Reference: (09/23) KK/JDP/BREU/4/11(a)

30 Rejab 1444
21 Februari 2023

Yang Mulia,
Pemangku Pengarah Perkhidmatan Pergigian
Jabatan Perkhidmatan Pergigian
Kementerian Kesihatan

Doktor,

ASSOCIATIONS BETWEEN EARLY-LIFE BEHAVIOURS, CONTEMPORARY ORAL HEALTH BEHAVIOURS AND ORAL HEALTH AMONGST CHILDREN IN BRUNEI DARUSSALAM AND THE IMPLICATIONS OF THESE FOR FUTURE ORAL HEALTH STRATEGY AND DENTAL HEALTH POLICY

Dengan hormatnya sukacita merujuk surat permohonan Doktor bertarikh 30 Januari 2023 mengenai perkara yang tersebut di atas.

2. Sehubungan dengan itu, sukacita dimaklumkan pihak Kementerian Kesihatan tidak ada halangan bagi **Dr Haji Majdi Bin Haji Awang Bakar, Pegawai Perubatan Gred II (Pergigian), No KPP: 00-296382 (K)** untuk membuat penyelidikan tertakluk pada penelitian dan kebenaran daripada pihak *Medical and Health Research Ethics Committee (MHREC)* atau badan etika yang bersesuaian; dan memastikan syarat-syarat dan keperluan lain yang berkaitan seperti perjanjian/dokumen undang-undang adalah teratur daripada pihak yang berkenaan; serta mendapatkan kebenaran Ketua Jabatan dimana penyelidikan berkenaan akan dilaksanakan.

Sekian disampaikan untuk makluman mengenainya.

'Bersama Ke Arah Warga Sihat'
'Menjayakan Wawasan Brunei 2035'

Dengan hormat,

[DR ANG SWEE HUI]

Timbalan Setiausaha Tetap (Profesional)

s.k:
Medical and Health Research & Ethics Committee

Appendix 7. Permission letter from the Deputy Permanent Secretary of the Ministry of Education (Malay version)

Fax : 2380101/2382398/2380050
Telex : MIEDU BU 2602
Cable : MIEDU BRUNEI
Telephone : 2381133



کمنتريڻ قنديديقتن
KEMENTERIAN PENDIDIKAN
MINISTRY OF EDUCATION
BANDAR SERI BEGAWAN BB3510
NEGARA BRUNEI DARUSSALAM

KPE/DG/306/15

Tarikh: 3 Rejab 1444H
25 Januari 2023M

Yang Mulia,
Dr Haji Majidi bin Haji Awang Bakar
Pegawai Pergigian
Jabatan Perkhidmatan Pergigian
Kementerian Kesihatan

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

MEMOHON KEBENARAN MEMBUAT KAJISELIDIK KESIHATAN MULUT MURID- MURID YANG BERUMUR 5 TAHUN DISEKOLAH-SEKOLAH RENDAH KERAJAAN DAN BUKAN KERAJAAN, DAERAH BRUNEI DAN MUARA

Dengan hormat sukacita merujuk surat Tuan Doktor bertarikh 26 Jamadilakhir 1444 bersamaan 19 Januari 2023 mengenai perkara diatas.

2. Sehubungan dengan itu, Pejabat ini tidak ada halangan bagi Tuan Doktor untuk membuat kajiselidik kesihatan mulut murid-murid yang berumur 5 tahun yang berada di darjah pra-sekolah atau kindergarten 3 dan memilih sekurang-kurang nya 10 buah sekolah di Daerah Brunei dan Muara yang akan bermula pada **8 Mei sehingga 31 Julai 2023** (tertakluk kepada perubahan).

3. Dalam hal ini, disarankan Tuan Doktor untuk menghubungi Jabatan Sekolah-Sekolah dan Jabatan Pendidikan Swasta bagi mendapatkan persetujuan terutama waktu kajian diadakan dan diharapkan kajian tersebut tidak akan menjejaskan waktu pengajaran dan pembelajaran pelajar.

Sekian untuk tindakan Tuan Doktor selanjutnya.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

"Mengukuhkan Sosio-Ekonomi Negara, Tanggungjawab Bersama"

(AWANG ALIUDDIN BIN HAJI ABDUL RAHMAN)
Timbalan Setiausaha Tetap (Pendidikan Teras)
Kementerian Pendidikan

s.k.
Setiausaha Tetap (Pendidikan Teras), Kementerian Pendidikan
Pegawai Tugas-Tugas Khas Kanan, Jabatan Pendidikan Swasta

Appendix 8. English Translation of the permission letters from the Deputy Permanent Secretaries of the Ministry of Health and the Ministry of Education

To:

Faculty of Health Sciences Research Ethic Committee

Trinity College Dublin

The University of Dublin

College Green

Dublin 2, Ireland

21st March 2023

Dear Research Ethic Committee,

RE: Malay translation to permission letters to conduct research in Brunei Darussalam

I submitted letters to the Ministry of Education and the Ministry of Health in Brunei Darussalam on the 19th and 30th of January 2023 respectively requesting permission to conduct the my research entitled “*Associations between early-life behaviours, contemporary oral health behaviours and oral health among children in Brunei Darussalam and their implications for oral health prevention strategies*” in Brunei Darussalam. Following that, I am sending you their subsequent permission letters that I received both on the of 25th January and 21st of February 2023.

The contents of the letters are as below:

1) From the Ministry of Health dated 21st February 2023:

“Sehubungan dengan itu, sukacita dimaklumkan pihak Kementerian Kesihatan tidak ada halangan bagi Dr Haji Majidi Bin Haji Awang Bakar, Pegawai Perubatan Gred II (Pergigian), No KPP: 00-296382 (K) untuk membuat penyelidikan tertakluk pada penelitian dan kebenaran daripada pihak Medical and Health Research Ethics Committee (MHREC) atau badan etika yang bersesuaian; dan memastikan syarat-syarat dan keperluan lain yang berkaitan seperti perjanjian/dokumen undang-undang adalah teratur daripada pihak yang berkenaan; serta mendapatkan kebenaran Ketua Jabatan dimana penyelidikan berkenaan akan dilaksanakan.”

Translation to this:

“With regard to that, the Ministry of Health is pleased to inform you that there is no objection for Dr Haji Majidi Bin Haji Awang Bakar, Medical Officer Grade II (Dental), IC No: 00-296382 (Y) to conduct the research survey subject to scrutiny and permission from the Medical and Health Research Ethics Committee (MHREC) or appropriate ethical body; and to ensure other relevant conditions and requirements such as agreements/legal documents are in order from the relevant parties; and obtain permission from the Head Department where the research will be carried out”.

2) From the Core Education Office, Ministry of Education dated 25th January 2023:

“Sehubungan dengan itu, Pejabat ini tidak ada halangan bagi Tuan Doktor untuk membuat kajiselidik kesihatan mulut murid-murid yang berumur 5 tahun yang berada di darjah pra-sekolah atau kindergarten 3 dan memilih sekurang-kurangnya 10 buah sekolah di Daerah Brunei dan Muara yang akan bermula pada 8 Mei sehingga 31 Julai 2023 (tertakluk kepada perubahan).”

Translation to this:

“With reference to this, the Core Education Office has no objections for you to conduct the oral health survey of students aged 5 who are in pre-school or Kindergarten 3 and select at least 10 schools in the Brunei Muara District, which will take place on the 8th of May until 31st of July 2023 (subject to change)”.

“Dalam hal ini, disarankan Tuan Doktor untuk menghubungi Jabatan Sekolah-Sekolah dan Jabatan Pendidikan Swasta bagi mendapatkan persetujuan terutama waktu kajian diadakan dan diharapkan kajian tersebut tidak akan menjejaskan waktu pengajaran dan pembelajaran pelajar.”

Translation to this:

“In this regard, it is recommended that you contact the Department of Schools and the Department of Private Education to obtain agreement, especially the schedule of the research survey which hopefully will not affect the students’ classes and learning time”.

Yours sincerely,



Dr Haji Majidi Haji Awang Bakar

- Principal Investigator

Verified by:



Dr Haji Amirul Rizan Haji Mohamed

- Clinical Supervisor of this research
- Head of Oral Health Promotion Unit & Head of Statistics Unit, Department of Dental Services, Brunei Darussalam

Appendix 9. Full ethics approval letter from Brunei MHREC

E-mail: mhrec@moh.gov.bn



MHREC Executive Screening Suite
Basement Carpark Level 1
Raja Isteri Pengiran Anak Saleha Hospital
Bandar Seri Begawan BA1710
Negara Brunei Darussalam

Our Ref : MHREC/MOH/2023/3(1)

19th April 2023
28 Ramadhan 1444

To:

Dr Haji Majidi Haji Awang Bakar
Dental Officer
National Dental Centre
Department of Dental Services
Ministry of Health

Dear Dr Haji Majidi,

Re: "Associations between early-life behaviours, contemporary oral health behaviours and oral health amongst children in Brunei Darussalam and their implications for oral health prevention strategies"

We are pleased to inform you that Medical and Health Research and Ethic Committee has given **full approval** to your research proposal entitled above.

Please adhere to the conditions stated below:

- The study should comply to the Guidelines for Good Clinical Practice
- Any deviation to the study should have MHREC's written approval. Failure to do so will be reported to the relevant authorities.
- Please provide us a report of your research findings

This approval is valid for one year commencing the date of this letter or for the duration of your study whichever is shorter. If you wish to extend your research beyond this period, you are required to apply to MHREC at least one month before the end of your approval including an annual report.

All the best with your research.

"BERSAMA KE ARAH WARGA SIHAT"
"Warga Berilmu, Negara Maju"

Yours Sincerely,

A handwritten signature in blue ink, appearing to be 'Hj Amalinda'.

[Dr Hjh Amalinda POKIP DSS Hj Suyoi]

Deputy Chairperson of Medical and Health Research & Ethics Committee

Cc 1. Deputy Permanent Secretary (Professional)
2. Director General of Medical and Health Services
3. Biomedical Research and Ethic Unit, BREU MOH

Associations between early-life behaviours, contemporary oral health behaviours and oral health amongst children in Brunei Darussalam and their implications for oral health prevention

Appendix 10. Full ethics approval letter from Faculty of Health Sciences, Trinity College Dublin



Coláiste na Tríonóide, Baile Átha Cliath
Trinity College Dublin
Ollscoil Átha Cliath | The University of Dublin

Dr. Haji Majidi Haji Awang Bakar,
School of Dental Science,
Dublin Dental University Hospital,
Trinity College Lincoln Place,
Dublin 2,
Ireland

7th July 2023

Ref: 221104
Title of Study: Associations between early-life behaviours, contemporary oral health behaviours and oral health amongst children in Brunei Darussalam and their implications for oral health prevention strategies

Dear Majidi

Further to a meeting of the Faculty of Health Sciences Ethics Committee held in July 2023. We are pleased to inform you that the above project has ethical approval to proceed.

This study has been ethically approved. We would advise you to seek review and comments on your DPIA from the DPO if required prior to study commencement.

As a researcher you must ensure that you comply with other relevant regulations, including DATA PROTECTION and HEALTH AND SAFETY.

We wish you every success with this study and should you require any assistance in the future please do not hesitate to contact us.

Yours sincerely,

A handwritten signature in black ink, reading 'Jacintha O'Sullivan'.

Prof. Jacintha O'Sullivan
Chairperson
Faculty Research Ethics Committee

Dámh na nEolaiochtai Sláinte
Foirgneamh na Ceimice,
Coláiste na Tríonóide,
Ollscoil Átha Cliath,
Baile Átha Cliath 2, Éire.

Faculty of Health Sciences
Chemistry Building,
Trinity College Dublin,
The University of Dublin,
Dublin 2, Ireland.

www.healthsciences.tcd.ie

Appendix 11. Letter of invitation to dental health survey to schools (English version)



Yang Mulia,
Guru Besar
Learning Tree School
Negara Brunei Darussalam

Muharram 1445
July 2023

Letter of invitation to dental health survey

Research title: The influence of children's dental habits on dental health and their implications for oral health strategies in Negara Brunei Darussalam

This dental health survey is part of a research being carried out by the Principal Investigator, who is a postgraduate student in the Clinical Doctorate in Dental Public Health Programme, Trinity College Dublin, University of Dublin in Ireland. The aim of this dental health survey is to provide accurate information regarding the dental health (dental cavities, teeth with fillings, teeth that have been removed) **among 5-year-old children**. These data will help to identify the priorities for future national dental health improvement policies within Negara Brunei Darussalam.

Your school has been randomly selected from all government and private schools within Brunei-Muara district for this research. As the Principal Investigator, I would like to invite your school to participate in this research. If you decide that your school will take part, I will ask for cooperation from the school to:

- identify a suitable date for the dental examination to take place (**Proposed date:** _____)
- identify an appropriate room for the dental examination
- email class lists of all **Kindergarten 2 and 3 (Afternoon sessions only)** (to include student names, gender, date of birth) Majidi.Bakar@dental.tcd.ie
- distribute dental survey envelopes containing documents including Consent Form and Questionnaire Form to selected parents/ guardians
- collect returned envelopes containing documents from selected parents/ guardians and the dental survey team will collect them on a later date

On the day of dental examination, the dental survey team will set up their mobile dental equipment at an agreed location at the school. The child will lie down on a dental chair. The dentists will use sterilised gloves and dental mirror for each child. The dentists will undertake simple, visual (non-invasive) dental examinations of the consented children's teeth for approximately 10 minutes. Children will not be forced to have a dental examination if they do not want to. It is up to the school's decision, whether parents/ guardians can come along or not, only if they request.



As the dental survey team has been treating and dealing with child patients as part of their daily job, there should cause no discomfort or distress to the children. If a child becomes upset at any point during the dental examination, the session will be stopped and he or she will not be asked to participate any further. The child will be given support by the dental survey team and the teacher in charge will be informed immediately.

If a parent/guardian requests a summary report of the dental examination within four weeks, that will be provided to them. All collected data is kept and sent securely to the Principal Investigator, who will then collate and analyse this to produce reports and recommendations. Individuals cannot be identified in these reports, as the data is anonymised from the dental examination stage and data will only be reported or published as grouped data.

It is hoped that your school will be able to assist the dental survey team in this dental health survey. The dental survey team will try to keep disruption to a minimum and ensure the children involved have a positive experience with the dental survey team.

I would be grateful if you could confirm the school's participation in this research by emailing to me at Majidi.Bakar@dental.tcd.ie or contacting me at +673-8694448.

Yours sincerely,

Dr. Haji Majidi Haji Awang Bakar

- Email address: Majidi.Bakar@dental.tcd.ie
- Telephone number: **8694448**
- Dental Officer, Department of Dental Services, Ministry of Health, Negara Brunei Darussalam
- Principal Investigator and Postgraduate student, Clinical Doctorate in Dental Surgery in Dental Public Health Programme, Trinity College Dublin, University of Dublin, Ireland (In-service Training Scheme)

To-do-list for school before the dental examination day

Date of dental examination: ____ . ____ . 2023 (Afternoon session)

To-do-list	Latest by
School to email class lists of all KG 2 and KG 3 (Afternoon session only) to <u>Majidi.Bakar@dental.tcd.ie</u> (to include student names, gender and date of birth)	. . 2023
School to identify an appropriate room for the dental examination	. . 2023
Dental team to come to the school to distribute dental survey envelopes containing documents including Cosent Form and Questionnaire Form to the school	. . 2023
School to distribute dental survey envelopes containing related documents to selected parents/guardians	. . 2023
School to collect returned envelopes containing related documents from selected parents/guardians	. . 2023
Dental team to come to the school to collect all returned dental survey envelopes containing related documents from the school	. . 2023

Appendix 12. Letter of invitation to dental health survey to schools (Malay version)



Yang Mulia,
Guru Besar
Sekolah Rendah _____
Negara Brunei Darussalam

Muharram 1445
Julai 2023

Jemputan bagi mengikuti kajiselidik kesihatan mulut

Tajuk kajian: Pengaruh tabiat kesihatan mulut kanak-kanak kepada kesihatan mulut dan kesannya terhadap strategi kesihatan mulut di Negara Brunei Darussalam

Kajiselidik kesihatan mulut ini adalah sebahagian daripada kajian yang dijalankan oleh Ketua Pengkaji, yang merupakan pelajar Ijazah Kedokteran Klinikal dalam Kesihatan Awam Pergigian, *Trinity College Dublin, University of Dublin di Ireland*. Matlamat kajiselidik kesihatan mulut ini adalah untuk memberikan maklumat yang tepat mengenai kesihatan mulut (gigi berlubang, gigi bertambal, gigi yang telah dicabut) di kalangan kanak-kanak yang berumur 5 tahun. Data-data ini akan membantu untuk mengenal pasti keutamaan bagi penambahbaikan pada strategi-strategi kesihatan mulut pada masa hadapan di Negara Brunei Darussalam.

Sekolah ini telah dipilih secara rawak daripada kesemua sekolah kerajaan dan swasta di Daerah Brunei-Muara untuk kajiselidik ini. Sebagai Ketua Pengkaji, saya ingin menjemput sekolah ini untuk mengambil bahagian dalam kajiselidik ini. Sekiranya pihak sekolah memutuskan untuk mengambil bahagian, saya akan meminta kerjasama daripada pihak sekolah untuk:

- mengenal pasti tarikh yang sesuai untuk pemeriksaan mulut dijalankan (**tarikh yang dicadangkan:** _____)
- mengenal pasti lokasi/bilik yang sesuai untuk pemeriksaan mulut
- menghantar senarai kelas bagi **Tahun Pra sahaja** (termasuklah nama pelajar, jantina dan tarikh lahir) melalui emel ke alamat emel **Majidi.Bakar@dental.tcd.ie**
- mengedarkan sampul yang mengandungi dokumen-dokumen termasuk Borang Kebenaran dan Borang Soal Selidik kepada ibu bapa/penjaga yang terpilih
- mengumpulkan sampul surat yang telah dipulangkan yang mengandungi dokumen-dokumen berkenaan daripada ibu bapa/penjaga yang terpilih dan Ketua Pengkaji akan mengambilnya nanti

Pada hari pemeriksaan mulut tersebut, pasukan kajiselidik akan menyediakan peralatan pergigian mudah alih di lokasi yang dipersetujui di sekolah. Kanak-kanak akan berbaring di atas kerusi pergigian. Pegawai Pergigian akan menggunakan sarung tangan dan cermin pergigian yang steril untuk setiap kanak-kanak. Pegawai Pergigian akan menjalankan pemeriksaan mulut yang mudah dan secara visual selama lebih kurang 10 minit. Kanak-kanak tidak akan dipaksa untuk membuat pemeriksaan mulut jika mereka tidak mahu. Jika ibu bapa/penjaga berhasrat untuk hadir menemani anak-anak mereka, kebenaran adalah terpujang kepada pihak sekolah.



Memandangkan pasukan kajiselidik telah menangani dan merawat pesakit kanak-kanak sebagai pekerjaan harian mereka, pemeriksaan mulut tersebut tidak sepatutnya akan menimbulkan ketidakselesaan atau keresahan kepada kanak-kanak. Jika kanak-kanak menjadi sangat resah pada bila-bila masa semasa pemeriksaan mulut, sesi pemeriksaan tersebut akan diberhentikan dan kanak-kanak tersebut tidak akan diminta untuk mengambil bahagian lagi. Kanak-kanak tersebut akan diberi sokongan oleh pasukan kajiselidik dan guru yang bertanggungjawab akan dimaklumkan dengan segera.

Laporan ringkasan pemeriksaan mulut kanak-kanak hanya akan diberikan, jika sekiranya ibu bapa/penjaga berhajat untuk memintanya dalam tempoh empat minggu setelah pemeriksaan mulut dilakukan. Semua data yang dikumpulkan akan disimpan dan dihantar dengan selamat kepada Ketua Pengkaji, yang kemudiannya akan menyusun dan menganalisisnya untuk menghasilkan laporan dan pengesyoran/rekomendasi. Identiti individu tidak akan dikenal pasti dalam laporan ini dan laporan hanya akan diterbitkan dalam bentuk data berkumpulan.

Adalah diharapkan agar pihak sekolah akan dapat memberikan kerjasama kepada pasukan kajiselidik dalam kajiselidik kesihatan mulut itu nanti. Pasukan kajiselidik akan memastikan kajiselidik ini akan berjalan dengan lancar dan juga memastikan agar kanak-kanak yang terlibat akan menerima pengalaman positif dengan pasukan kajiselidik.

Saya amat menghargai jika pihak sekolah akan dapat memberikan pengesahan sama ada pihak sekolah akan mengambil bahagian dalam kajiselidik ini atau sebaliknya dengan menghantar e-mel kepada saya di Majidi.Bakar@dental.tcd.ie atau menghubungi saya di +673-8694448.

Yang benar,

Dr. Haji Majidi Haji Awang Bakar

- Alamat emel: Majidi.Bakar@dental.tcd.ie
- Nombor telefon: **8694448**
- Pegawai Pergigian, Jabatan Perkhidmatan Pergigian, Kementerian Kesihatan, Brunei Darussalam
- Ketua Pengkaji dan Pelajar Ijazah Kedoktoran Klinikal bagi Kesihatan Awam Pergigian, Trinity College Dublin, University of Dublin, Ireland (Latihan Dalam Perkhidmatan)

Senarai tugas untuk pihak sekolah sebelum tarikh pemeriksaan mulut

Tarikh pemeriksaan mulut: ____ . ____ . 2023

Senarai tugas	Tarikh terakhir
Pihak sekolah untuk menghantar senarai kelas bagi Tahun Pra sahaja (termasuklah nama pelajar, jantina dan tarikh lahir) melalui emel ke alamat emel <u>Majidi.Bakar@dental.tcd.ie</u>	. . 2023
Pihak sekolah untuk mengenal pasti lokasi/ bilik yang sesuai untuk pemeriksaan mulut	. . 2023
Pasukan kajiselidik akan hadir ke sekolah untuk mengedarkan sampul yang mengandungi dokumen-dokumen termasuk Boarng Kebenaran dan Borang Soal Selidik kepada pihak sekolah	. . 2023
Pihak sekolah untuk mengedarkan sampul yang mengandungi dokumen-dokumen berkenaan kepada ibu bapa/penjaga yang terpilih	. . 2023
Pihak sekolah untuk mengumpulkan sampul surat yang telah dipulangkan yang mengandungi dokumen-dokumen berkenaan daripada ibu bapa/penjaga yang terpilih	. . 2023
Pasukan kajiselidik akan hadir ke sekolah untuk mengambil semua sampul surat yang mengandungi dokumen-dokumen berkenaan dari pihak sekolah	. . 2023

Appendix 13. Invitation letter to parents (English version)

**Please take this Invitation
Letter for your reference**



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin



كementerian Kesihatan
KEMENTERIAN KESIHATAN
MINISTRY OF HEALTH

Dear Parent(s)/ Guardian,

Invitation Letter to Parents/ Guardian (For Dental Health Survey)

Research title: The influence of children's dental habits on dental health and their implications for oral health strategies in Negara Brunei Darussalam

I am a Dental Doctorate student in Dental Public Health at Trinity College Dublin, University of Dublin, Ireland. As part of my studies, I am carrying out a research on the above-mentioned title. This research has been approved by the Research Ethics Committee (REC) of Trinity College Dublin, University of Dublin, Ireland on 07/07/2023 and also the Medical and Health Research Ethic Committee (MHREC), Negara Brunei Darussalam on 19/04/2023.

The research will gather up-to-date data about dental health in 5-year-old children living in Negara Brunei Darussalam. This research will also investigate if children's dental health-related behaviours, both at an early age and at the current time, are related to the extent and severity of dental diseases. The aim of this research is to identify recommendations for future national oral health strategies and policies for the Department of Dental Services in Negara Brunei Darussalam.

I would like to invite you and your child to take part in this research. It is entirely voluntary. You can read the enclosed **Information Leaflet** and if you agree to take part in the research, please complete the enclosed **consent form** and **Questionnaire**. The Questionnaire will take **approximately 20 to 30 minutes** to complete. If you prefer the electronic versions, please click the link below which will bring you to the SurveyMonkey:

https://nursingandmidwifery.fra1.qualtrics.com/jfe/form/SV_b9Fwbaj4XeQVUIS

Please contact me at **Majidi.Bakar@dental.tcd.ie** if you have any questions regarding this research. Thank you for time and cooperation.

Yours sincerely,

Dr. Haji Majidi Haji Awang Bakar

- Email address: Majidi.Bakar@dental.tcd.ie
- Dental Officer, Department of Dental Services, Ministry of Health, Negara Brunei Darussalam
- Principal Investigator and Postgraduate student, Clinical Doctorate in Dental Surgery in Dental Public Health Programme, Trinity College Dublin, University of Dublin, Ireland (In-service Training Scheme)

Appendix 14. Invitation letter to parents (Malay version)

**Sila ambil Surat Jemputan ini
untuk rujukan awda**



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin



كەنترين كصیحتن
KEMENTERIAN KESIHATAN
MINISTRY OF HEALTH

Kepada Ibu/ Bapa/ Penjaga,

Surat Jemputan kepada Ibu bapa/ Penjaga (Bagi Kajiselidik Kesihatan Mulut)

Nama kajian: Pengaruh tabiat kesihatan mulut bagi kanak-kanak kepada kesihatan mulut dan kesannya terhadap strategi kesihatan mulut di Negara Brunei Darussalam

Saya merupakan seorang pelajar Kedoktoran Pergigian dalam Kesihatan Awam Pergigian di Trinity College Dublin, University of Dublin, Ireland. Sebagai sebahagian daripada pengajian saya, saya sedang menjalankan kajian yang disebutkan di atas. Kajian ini telah mendapat kebenaran daripada Jawatankuasa Etika Penyelidikan (REC) di *Trinity College Dublin, University of Dublin, Ireland* pada 07/07/2023 dan juga Jawatankuasa Etika Penyelidikan Perubatan dan Kesihatan (MHREC), Negara Brunei Darussalam pada 19/04/2023.

Kajian ini dijalankan untuk mengumpul data terkini tentang kesihatan mulut dikalangan kanak-kanak yang berumur 5 tahun di Negara Brunei Darussalam. Kajian ini juga akan meneliti jika tabiat penjagaan kesihatan mulut kanak-kanak, pada usia awal dan sekarang, ada berkait rapat dengan tahap penyakit/ masalah kesihatan mulut. Matlamat kajian ini adalah untuk mengenal pasti cadangan bagi strategi dan dasar kesihatan mulut pada masa hadapan bagi Jabatan Perkhidmatan Pergigian.

Saya ingin menjemput awda dan anak awda untuk mengambil bahagian dalam kajian ini. Penyertaan adalah secara sukarela. Awda boleh membaca **Risalah Maklumat** yang disertakan dan jika awda bersetuju untuk mengambil bahagian dalam kajian ini, sila lengkapkan **Borang Kebenaran** dan **Borang Soal Selidik** yang disertakan. **Borang Soal Selidik** akan mengambil masa kira-kira **20 hingga 30 minit** untuk disiapkan. Jika awda memilih versi elektronik, sila klik pautan di bawah ini dan ianya akan membawa awda ke SurveyMonkey:

https://nursingandmidwifery.fra1.qualtrics.com/jfe/form/SV_b9Fwbaj4XeQVUIS

Sila hubungi saya melalui emel di alamat emel Majidi.Bakar@dental.tcd.ie jika awda mempunyai sebarang soalan mengenai kajian ini. Terima kasih atas masa dan Kerjasama awda.

Yang benar,

Dr. Haji Majidi Haji Awang Bakar

- Alamat emel: Majidi.Bakar@dental.tcd.ie
- Pegawai Pergigian, Jabatan Perkhidmatan Pergigian, Kementerian Kesihatan, Negara Brunei Darussalam
- Ketua Pengkaji dan Pelajar Ijazah Kedoktoran Klinikal bagi Kesihatan Awam Pergigian, Trinity College Dublin, University of Dublin, Ireland (Latihan Dalam Perkhidmatan)

Appendix 15. Participant Information Leaflet (English version)

Please take this Information Leaflet for your reference



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin



كەنتەرین كەسپچەن
KEMENTERIAN KESIHATAN
MINISTRY OF HEALTH

Parent/ Guardian Participant Information Leaflet (For Dental Health Survey)

Research title: The influence of children's dental habits on dental health and their implications for oral health strategies in Negara Brunei Darussalam

Site:	Participating schools
Principal Investigator:	Dr. Haji Majidi Haji Awang Bakar Dental Doctorate student in Dental Public Health Trinity College Dublin, University of Dublin, Ireland Email: Majidi.Bakar@dental.tcd.ie Contact number: +673-8694448
Co-investigators:	Dr. Clare Jones Academic Supervisor in Dental Public Health Email: jonesc8@tcd.ie Dr. Brett Duane Associate Professor of Dental Public Health Email: Duane.Brett@dental.tcd.ie Dr. Maria van Harten Dental Public Health Tutor Email: Maria.VanHarten@dental.tcd.ie All of them are from Trinity College Dublin, University of Dublin, Ireland
Clinical supervisor:	Dr. Haji Amirul Rizan Haji Mohamed Head of Research and Development Unit, Department of Dental Services, Negara Brunei Darussalam Email: rizan.mohamed@moh.gov.bn
Research Organiser:	Dr. Haji Majidi Haji Awang Bakar
Data Controller:	Trinity College Dublin, University of Dublin, Ireland & Department of Dental Services, Negara Brunei Darussalam
Data Protection Officer:	Data Protection Officer Trinity College Dublin, University of Dublin, Ireland Email: dataprotection@tcd.ie

We would like to invite you and your child to take part in a research that is being carried out by Dr. Haji Majidi (Principal Investigator) as part of his academic qualifications in Trinity College Dublin, University of Dublin, Ireland.

Before you decide whether or not you wish yourself and your child to take part, please read this **Information Leaflet** carefully. Please contact Dr. Haji Majidi at Majidi.Bakar@dental.tcd.ie if you have any questions.

Don't feel rushed or under pressure to consent to your child taking part or to make a quick decision. You should understand the risks and benefits of your child and you taking part in this research so that you can make a decision that is right for you and your child. You may wish to discuss it with your family, friends or medical doctor. If you are interested in taking part, we would ask that you provide your consent **before the date of dental examination**.

This leaflet has 5 parts:

Part 1 – The Research

Part 2 – Data Protection

Part 3 – Approval, Organising and Funding

Part 4 – Future Research

Part 5 – Further information

Part 1 – The Research

Why is this research being done?

We are doing this research to gather up-to-date data about dental health in 5-year-old children living in Negara Brunei Darussalam. This research will also investigate if children's dental health-related behaviours, both at an early age and at the current time, are related to the extent and severity of dental diseases. The aim of this research is to identify recommendations for future national oral health strategies and policies for the Department of Dental Services in Negara Brunei Darussalam.

Why has my child and I been invited to take part?

Your child is being invited to take part as he/ she will be 5 years old when the dental survey team visits his/ her school. Other 5-year-old children at your child's school have also been asked to take part. Your child's school has been selected at random from a list of all schools in Brunei-Muara District and they have kindly agreed to host the dental survey team.

You are asked to take part to complete a **questionnaire** that will help us understand if different methods of preventing dental problems are effective for all groups in the community.

Why your help is important?

We are hoping to involve 335 children from different schools in Brunei Muara District in order to produce the best information to inform future decision-making and policies.

It does not matter what your child's dental condition is like, we need to include those with big and little problems, those with perfect teeth and those with not-so-perfect teeth, those who attend their own dentist and those who do not. The examining dentists just want to record what they find.

Does my child have to take part?

No, your child does not have to take part in this research. It is entirely voluntary. If you decide not to consent to your child's participation or to withdraw your consent to their participation, it will not affect your child's education and current or future dental health care.

What happens if I change my mind?

You can change your mind and withdraw your child from the research at any time. If you choose to withdraw your consent for your child to take part before the dental survey team visits your child's school, your child will not be examined.

If you do this after your child has been examined, you can request that data collected not to be used in the analysis. However, when the data is pooled together for analysis, we will no longer be able to identify your child. If you wish to withdraw from the research, please contact Dr. Haji Majidi at Majidi.Bakar@dental.tcd.ie who will arrange this for you.

What does taking part in the research involve?

If you decide to take part, you can discuss this **Information Leaflet** and **Consent Form** with the Principal Investigator by emailing him at Majidi.Bakar@dental.tcd.ie. You may choose to complete either an electronic or a paper Consent Form.

The **questionnaire** will ask you about your child's medical and dental health, their dental habits, dietary information, and use of dental services. There will also be some questions about your household to help us understand if different methods of preventing dental problems are equally effective for all groups within the community. The **questionnaire** will take **approximately 20-30 minutes** to complete.

At the end of the **questionnaire**, you will be asked if you would like to take part in an interview with one of the researchers. The aim of the interview will be to understand your views regarding the dental health-related behaviours of 5-year-old children in Negara Brunei Darussalam. If you are interested, you will be asked to provide your contact number and email address so that a member of the research team may contact you and provide you with information on what taking part in the interview will involve. We will only interview at least 6 parents/guardians.

How will the dental examination be carried out?



With your permission, during the dental examination day at your child's school,

- your child will lie down on a dental chair
- the dentists will use new gloves and sterilised dental mirror for each child



- the dentists will have a quick look at your child's teeth and it will only **approximately 10 minutes**
- your child will not be forced to have a dental examination if he/she does not want to
- Please note: This does not replace your child's regular dental appointments and no dental treatment (e.g. dental filling) will be carried out by the dentists. It is up to the school's decision, whether you can come along or not.

Are there any benefits for me and my child taking part in this research?

If you consent for your child to take part, and if you requested it, you will be provided with a summary report on your child's dental examination. There will be no immediate benefit to your child. It is hoped that this research will contribute to oral health prevention strategies in the future.

Are there any risks to me or my child if he/ she takes part?

As the dental survey team members have been dealing with and treating child patients as their daily job for many years, there should be no discomfort or distress to your child.

If a child becomes upset at any point during the dental examination, the session will be stopped, and he or she will not be asked to participate any further. The child will be given support by the dental survey team and the teacher in charge will be informed immediately. There are no known risks involved for you taking part in this research.

What will happen to the results of the research?

A summary report about your child's teeth will be provided, only if you request it. The request can be made by emailing Majidi.Bakar@dental.tcd.ie **within a maximum of four weeks** following the completion of the dental examination. The summary report will then be emailed to you **within two weeks** after sending your request.

The results of the research will be reported in medical and scientific journals and disclosed at medical and scientific conferences. No information which reveals either your or your child's identity will be disclosed in any publication.

Part 2 – Data Protection

What information (personal data) about me and my child will be used as part of this research?

We will collect your personal data (name, email address and telephone number) which will only be used to contact you in case of missing documents/ data and also for the interview, only if you express your interest. Your child's personal data (name and date of birth) will only be used to identify your child as the selected participant for the research.

We will also ask you to complete a **questionnaire** to collect personal data on child's medical history, ethnicity, parent's or guardian's highest education attainment, employment status and household income per month. We will also collect some data concerning your child's behaviours related to dental health in the **questionnaire** as well as your child's dental health during the dental examination.

Who will access and use my and my child's personal data as part of this research?

The following research team will access to your child's original personal data:

- Dr. Haji Majidi, Dr. Haji Rizan (Clinical Supervisor) and Dr. Maria van Harten (Statistician) will access them before, during and after dental examination activity
- The dental examination team members will access them before and during dental examination activity only

How will my and my child's personal data be kept confidential?

Your and your child's privacy is important to the research team. All information will be kept confidential and secure.

We will keep an electronic version of the data you give us on password-protected Microsoft 365, which is secured and supported by Trinity College Dublin. We will use password protection on every file containing personal data, encryption (special software to scramble the data so it cannot be read) and up to date antivirus software to protect the data on the computer.

How long will my personal data and my child's personal data used for this research be retained for?

Your personal data and your child's data will be retained in password-protected files for 3 years after the Principal Investigator finishes his dental doctorate studies. After 3 years, all data will be deleted and destroyed by him in accordance with standard University procedures.

What is the lawful basis to use my personal data?

We will only use the personal information for this research¹ which we hope will to identify recommendations for future national oral health strategies and policies in Negara Brunei Darussalam². You will be asked to provide your explicit consent to use your and your child's data as a requirement of Health Research Regulations in Ireland.

¹ European Union (UN) General Data Protection Regulation (GDPR) Article 9(2) (j)

² GDPR Article 6(1) (e)

Part 5 – Further Information

Who should I contact for information or concerns?

If you have any concerns or questions, you can contact:

Principal Investigator:	Dr. Haji Majidi Haji Awang Bakar Dental Doctorate student in Dental Public Health Trinity College Dublin, University of Dublin, Ireland Email: Majidi.Bakar@dental.tcd.ie Contact number: +673-8694448
Data Protection Officer:	Data Protection Officer Secretary's Office Trinity College Dublin, University of Dublin, Ireland Email: dataprotection@tcd.ie Website: www.tcd.ie/privacy

Under EU GDPR, if you are not satisfied with how your data is being processed, you have the right to raise a concern with the Office of the Data Protection Commission, 21 Fitzwilliam Square South, Dublin 2, Ireland. Website: www.dataprotection.ie.

Will I be contacted again?

We will contact you again in case of missing important documents and data, for example, Consent Forms and also only if you express your interest and are selected to take part in the interview session.

Appendix 16. Participant Information Leaflet (Malay version)

**Sila ambil Risalah Maklumat
ini untuk rujukan awda**



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin



كـمـنـتـرـيـن كـصـيـحـتـن
KEMENTERIAN KESIHATAN
MINISTRY OF HEALTH

Risalah Maklumat Peserta untuk Ibumama/Penjaga (Bagi Kajiselidik Kesihatan Mulut)

Nama kajian: Pengaruh tabiat kesihatan mulut bagi kanak-kanak kepada kesihatan mulut dan kesannya terhadap strategi kesihatan mulut di Negara Brunei Darussalam

Tempat:	Sekolah-sekolah yang mengambil bahagian
Ketua Pengkaji:	Dr. Haji Majidi Haji Awang Bakar Pelajar Ijazah Kedoktoran Klinikal bagi Kesihatan Awam Pergigian Trinity College Dublin, University of Dublin, Ireland Emel: Majidi.Bakar@dental.tcd.ie Nombor telefon: +673-8694448
Pengkaji Bersama:	Dr. Clare Jones Penyelia Akademik dalam Kesihatan Awam Pergigian Emel: jonesc8@tcd.ie Dr. Brett Duane Profesor Madya dalam Kesihatan Awam Pergigian Emel: Duane.Brett@dental.tcd.ie Dr. Maria van Harten Tenaga Pengajar dalam Kesihatan Awam Pergigian Emel: Maria.VanHarten@dental.tcd.ie Kesemua Pengkaji Bersama adalah dari Trinity College Dublin, University of Dublin, Ireland
Penyelia Klinikal:	Dr. Haji Amirul Rizan Haji Mohamed Ketua Unit Penyelidikan dan Pembangunan, Jabatan Perkhidmatan Perigigian, Negara Brunei Darussalam Emel: rizan.mohamed@moh.gov.bn
Pengajur Kajian:	Dr. Haji Majidi Haji Awang Bakar
Pengawal Data:	Trinity College Dublin, University of Dublin, Ireland & Jabatan Perkhidmatan Perigigian, Negara Brunei Darussalam
Pegawai Perlindungan Data:	Data Protection Officer Trinity College Dublin, University of Dublin, Ireland Emel: dataprotection@tcd.ie

Kami ingin menjemput awda dan anak awda untuk mengambil bahagian dalam kajian yang sedang dijalankan oleh Dr. Haji Majidi (Ketua Pengkaji) sebagai sebahagian daripada pengajiannya di Trinity College Dublin, University of Dublin, Ireland.

Sebelum awda membuat keputusan samaada awda dan anak awda akan menyertai kajian ini atau tidak, sila baca **Risalah Maklumat** ini dengan teliti. Sila hubungi Ketua Pengkaji melalui Majidi.Bakar@dental.tcd.ie jika awda mempunyai soalan.

Jangan tergesa-gesa atau berasa tertekan untuk membuat keputusan atau membenarkan anak awda untuk mengambil bahagian. Awda harus memahami risiko dan faedah kajian ini kepada awda dan anak awda, jika awda membuat keputusan untuk mengambil bahagian. Awda dibolehkan untuk berbincang dengan keluarga, rakan-rakan atau doktor perubatan awda, jika perlu. Jika awda berminat untuk mengambil bahagian, kami akan memohon awda untuk memberikan kebenaran awda **sebelum tarikh pemeriksaan mulut di sekolah anak awda**.

Risalah ini mempunyai 5 bahagian:

Bahagian 1 – Kajian

Bahagian 2 – Perlindungan Data

Bahagian 3 – Kebenaran, Penganjuran dan Pembiayaan

Bahagian 4 – Kajian Dimasa Hadapan

Bahagian 5 – Maklumat Lanjut

Bahagian 1 - Kajian

Kenapa kajian ini dijalankan?

Kajian ini dijalankan untuk mengumpul data terkini tentang kesihatan mulut dikalangan kanak-kanak yang berumur 5 tahun di Negara Brunei Darussalam. Kajian ini juga akan meneliti jika tabiat penjagaan kesihatan mulut kanak-kanak, pada usia awal dan sekarang, ada berkait rapat dengan tahap penyakit/ masalah kesihatan mulut. Matlamat kajian ini adalah untuk mengenal pasti cadangan bagi strategi dan dasar kesihatan mulut pada masa hadapan bagi Jabatan Perkhidmatan Pergigian.

Mengapa saya dan anak saya dijemput untuk mengambil bahagian?

Anak awda layak untuk menyertai kajian ini kerana anak awda berumur 5 tahun semasa pasukan kajiselidik melawat sekolah anak awda nanti. Kanak-kanak lain yang berumur 5 tahun juga akan dijemput untuk menyertainya. Sekolah anak awda telah dipilih secara rambang daripada senarai sekolah di Daerah Brunei dan Muara, dan sekolah itu telah pun bersetuju untuk mengambil bahagian dalam kajian ini.

Awda dijemput untuk mengambil bahagian dengan melengkapkan **Borang Soal Selidik** yang akan membantu kami untuk memahami strategi yang terbaik untuk mencegah masalah kesihatan mulut yang berkesan untuk semua kumpulan dalam komuniti/ masyarakat.

Kenapa bantuan awda penting?

Kajian ini memerlukan 335 kanak-kanak dari sekolah-sekolah yang terpilih di Daerah Brunei dan Muara bagi menghasilkan data untuk membentuk strategi dan dasar pada masa akan datang. Kajian ini akan mengambil kira apa jua keadaan kesihatan mulut anak awda. Kajian ini memerlukan kanak-kanak yang mempunyai masalah kesihatan mulut yang besar dan kecil, yang mempunyai mulut yang sihat dan kurang sihat, dan juga mereka yang pernah berjumpa doktor/jururawat pergigian dan yang tidak pernah. Pasukan kajiselidik hanya akan mencatat apa yang mereka lihat.

Perlukan anak saya untuk ikut serta dalam kajian ini?

Tidak. Bukanlah menjadi satu kemestian untuk anak awda menyertai kajian ini kerana penyertaan adalah secara sukarela. Jika awda membuat keputusan untuk tidak memberi kebenaran bagi penyertaan anak awda, ianya tidak akan menjejaskan pembelajaran dan perkhidmatan kesihatan mulut anak awda pada masa ini dan akan datang.

Apa yang berlaku jika saya berubah fikiran?

Awda boleh berubah fikiran dan menarik balik kebenaran anak awda daripada menyertai kajian ini pada bila-bila masa. Jika awda memilih untuk menarik balik kebenaran tersebut sebelum pemeriksaan mulut dilakukan, pemeriksaan mulut tidak akan dilakukan.

Sekiranya awda berbuat demikian setelah anak awda diperiksa, maka awda boleh memohon bagi data yang diperolehi untuk tidak dianalisa/ dihuraikan oleh pasukan kajiselidik. Identiti anak awda tidak akan dapat dikenalpasti apabila data anak awda dikumpulkan dengan data kanak-kanak lain. Jika awda ingin menarik diri daripada kajian ini, sila hubungi Dr. Haji Majidi melalui emel Majidi.Bakar@dental.tcd.ie.

Bagaimanakah kajian ini akan dijalankan?

Jika awda memutuskan untuk mengambil bahagian, awda boleh membincangkan **Risalah Maklumat** ini dan **Borang Kebenaran** dengan Ketua Pengkaji dengan menghantar e-mel kepadanya di Majidi.Bakar@dental.tcd.ie. Awda boleh memilih untuk melengkapkan **Borang Kebenaran** dan **Borang Soal Selidik** sama ada melalui elektronik atau melalui borang-borang kertas yang disertakan di dalam sampul ini.

Borang Soal Selidik yang disertakan di dalam sampul ini akan bertanya kepada awda tentang sejarah kesihatan dan mulut anak awda, tabiat kesihatan mereka, maklumat pemakanan dan penggunaan perkhidmatan pergigian. Terdapat juga beberapa soalan tentang isi rumah awda untuk membantu kami memahami sama ada kaedah yang berbeza untuk mencegah masalah kesihatan mulut adalah berkesan untuk semua kumpulan dalam komuniti/ masyarakat. **Borang Soal Selidik** ini akan mengambil masa **lebih kurang 20-30 minit** untuk dilengkapkan.

Di penghujung **Borang Soal Selidik** itu, awda akan ditanya sama ada awda berkeinginan untuk mengambil bahagian dalam temu bual dengan salah seorang pengkaji. Tujuan temu bual adalah untuk memahami pandangan awda mengenai dengan tingkah laku berkaitan kesihatan mulut kanak-kanak yang berumur 5 tahun di Negara Brunei Darussalam. Jika awda berminat, awda akan diminta untuk memberikan nombor telefon dan alamat e-mel awda supaya pasukan kajiselidik boleh menghubungi awda. Kami hanya akan menemu bual sekurang-kurangnya 6 orang ibu/ bapa/ penjaga.

Bagaimanakah pemeriksaan mulut itu akan diadakan?



Setelah mendapat kebenaran awda, semasa hari pemeriksaan mulut di sekolah anak awda,

- anak awda akan duduk di atas kerusi pergigian
- pasukan kajiselidik akan menggunakan sarung tangan dan cermin steril (bebas daripada kuman) untuk setiap kanak-kanak



- pasukan kajiselidik akan memeriksa mulut anak awda **lebih kurang selama 10 minit**
- anak awda tidak akan dipaksa untuk mengikutinya jika dia tidak bersedia/ mahu
- Nota: Pemeriksaan mulut ini **BUKANLAH** bertujuan untuk menggantikan perjanjian pemeriksaan mulut anak awda. Tiada rawatan pergigian (seperti tambalan gigi) akan dilakukan. Terpulang kepada keputusan pihak sekolah, sama ada awda boleh hadir atau tidak.

Apakah faedah untuk saya dan anak saya jika mengambil bahagian dalam kajian ini?

Jika awda membenarkan anak awda untuk mengambil bahagian, dan jika awda memintanya, awda akan diberikan laporan ringkasan mengenai pemeriksaan mulut anak awda. Kajian ini diharapkan akan dapat menyumbang kepada strategi kesihatan mulut pada masa hadapan.

Apakah risiko kepada saya atau anak saya jika mengambil bahagian dalam kajian ini?

Tiada risiko kepada awda dan anak awda jika mengambil bahagian dalam kajian ini. Memandangkan pasukan kajiselidik telah menangani dan merawat pesakit kanak-kanak sebagai pekerjaan harian mereka, pemeriksaan mulut tersebut tidak sepatutnya akan menimbulkan ketidakselesaan atau keresahan kepada kanak-kanak. Jika kanak-kanak menjadi sangat resah pada bila-bila masa semasa pemeriksaan mulut dijalankan, sesi pemeriksaan tersebut akan diberhentikan dan kanak-kanak tersebut tidak akan diminta untuk mengambil bahagian lagi. Kanak-kanak tersebut akan diberi sokongan oleh pasukan kajiselidik dan guru yang bertanggungjawab akan dimaklumkan dengan segera.

Apakah yang akan berlaku kepada hasil kajian ini?

Laporan ringkasan pemeriksaan mulut anak awda hanya akan diberikan, jika sekiranya awda berhajat untuk memintanya melalui emel Majidi.Bakar@dental.tcd.ie dalam tempoh 4 minggu setelah pemeriksaan mulut dilakukan. Laporan ringkasan kemudiannya akan dihantar kepada awda melalui e-mel dalam masa 2 minggu selepas menghantar permintaan awda.

Hasil kajian akan dilaporkan ke dalam jurnal-jurnal perubatan dan saintifik serta akan dikongsikan bersama di persidangan-persidangan perubatan dan saintifik. Identiti individu tidak akan dikenalpasti dalam laporan ini dan laporan hanya akan diterbitkan dalam bentuk data berkumpulan.

Bahagian 2 – Perlindungan Data

Apakah data peribadi saya dan anak saya yang akan digunakan dalam kajian ini?

Data peribadi awda (nama, alamat emel dan nombor telefon) hanya akan digunakan untuk menghubungi awda sekiranya terdapat sebarang kehilangan dokumen dan data penting, dan juga jika awda berminat, dan terpilih, untuk ditemu bual. Data peribadi anak awda (nama dan tarikh lahir) hanya akan digunakan untuk kajian ini.

Awda juga diminta untuk melengkapkan **Borang Soal Selidik** dan melalui borang ini, data-data berikut akan kami perolehi: sejarah kesihatan, tabiat kesihatan mulut, etnik/bangsa kanak-kanak, pencapaian pendidikan tertinggi ibu bapa atau penjaga, status pekerjaan dan pendapatan isi rumah setiap bulan. Kami juga akan mengumpul beberapa data mengenai kesihatan mulut anak awda melalui pemeriksaan mulut.

Siapakah yang akan mengakses/ mencapai data peribadi saya dan anak saya dalam kajian ini?

Berikut adalah pasukan kajiselidik yang akan mengakses/ mencapai data peribadi asal awda:

- Dr. Haji Majidi, Dr. Haji Rizan (Penyelia Klinikal) dan Dr. Maria (Penyelia Statistik) akan mengakses/ mencapainya sebelum, semasa dan selepas aktiviti pemeriksaan mulut
- Pasukan pemeriksaan mulut akan mengakses/ mencapainya sebelum dan semasa aktiviti pemeriksaan mulut

Bagaimanakah data peribadi saya dan anak saya akan dirahsiakan?

Kerahsiaan/ privasi awda dan anak awda adalah penting kepada pasukan kajiselidik. Semua maklumat akan dirahsiakan dan dilindungi dengan selamat.

Kami akan menyimpan data versi elektronik awda ke dalam *Microsoft 365* yang dilindungi dengan kata laluan, yang disokong oleh Trinity College Dublin, Ireland. Untuk melindungi data peribadi awda dan anak awda, setiap fail akan dilindungi dengan kata laluan dan komputer yang digunakan akan dilindungi dengan perisian anti-virus.

Berapa lamakah data peribadi saya dan data anak saya yang digunakan untuk kajian ini akan disimpan?

Data peribadi awda dan anak awda akan disimpan ke dalam fail *Microsoft 365* yang dilindungi dengan kata laluan selama 3 tahun selepas Ketua Pengkaji menamatkan pengajiannya. Selepas 3 tahun, semua data akan dipadam dan dimusnahkan oleh Ketua Pengkaji dengan mengikut prosedur universiti.

Apakah undang-undang asas dalam penggunaan data peribadi saya dan anak saya?

Kami hanya akan menggunakan maklumat peribadi awda dan anak awda untuk kajian ini¹ yang mana ianya akan dapat mengenal pasti cadangan untuk strategi dan dasar kesihatan mulut pada masa hadapan di Negara Brunei Darussalam². Awda dikehendaki untuk memberikan kebenaran yang jelas bagi penggunaan data awda dan anak awda selaras dengan keperluan 'Peraturan Penyelidikan Kesihatan' di Ireland dan Negara Brunei Darussalam.

¹ Peraturan Perlindungan Data Am Eropah (GDPR) Perkara 9(2) (j)

² GDPR Perkara 6(1) (e)

Apakah hak-hak saya?

Berhubung dengan data peribadi awda dan anak awda, awda berhak untuk:

- Mengakses/ mencapai data yang kami perolehi serta menerima salinannya
- Membantah pemprosesan data yang kami diperolehi
- Membantah pemprosesan lanjut pada data yang kami diperolehi
- Memperbetulkan atau memadam data yang kurang tepat
- Memohon untuk dipadamkan data yang diperolehi

Awda boleh menggunakan hak ini dengan menghantarkan e-mel kepada Ketua Pengkaji di Majidi.Bakar@dental.tcd.ie.

Bahagian 3 – Kebenaran, Penganjuran dan Pembiayaan

Adakah kajian ini telah mendapat kebenaran daripada Jawatankuasa Etika Penyelidikan?

Kajian ini telah mendapat kebenaran daripada:

- **Jawatankuasa Etika Penyelidikan Trinity College Dublin** pada 07-07-2023 (Nombor Rujukan Projek: 221104). Emel: ethicscommittee@tcd.ie
- **Jawatankuasa Etika Penyelidikan Perubatan dan Kesihatan, Negara Brunei Darussalam** pada 19-04-2023 (Nombor Rujukan Projek: MHREC/MOH/2023/3(1)). Emel: mhrec@moh.gov.bn

Siapakah yang menjalankan dan membiayai kajian ini? Adakah hasil kajian ini akan digunakan untuk tujuan komersial?

Kajian ini dianjurkan oleh Dr. Haji Majidi sebagai sebahagian daripada pengajiannya. Bajet pelajar yang disediakan oleh Trinity College Dublin telah digunakan untuk membeli peralatan pergigian, berus gigi dan bahan-bahan lain yang berkaitan untuk kajian ini. Hasilnya tidak akan digunakan untuk tujuan komersial/ perdagangan.

Adakah bayaran akan diterima jika mengambil bahagian dalam kajian ini?

Awda dan anak awda tidak akan menerima sebarang bayaran apabila menyertai kajian ini. Apabila pemeriksaan mulut telah selesai, anak awda akan menerima penghargaan (contoh berus gigi dan pelekat) di atas masa dan kerjasama yang diberikan.

Bahagian 4 – Kajian Dimasa Hadapan

Adakah data peribadi saya dan anak saya akan digunakan untuk kajian dimasa hadapan?

Jika awda bersetuju, kami akan menyimpan maklumat yang dikumpul daripada kajian ini untuk kajian kesihatan mulut kanak-kanak dimasa hadapan.

Bahagian 5 – Maklumat Lanjut

Siapa yang patut dihubungi untuk sebarang pertanyaan atau kemusykilan?

Jika awda mempunyai sebarang pertanyaan atau kemusykilan, awda boleh menghubungi:

Ketua Pengkaji:	Dr. Haji Majidi Haji Awang Bakar Pelajar Ijazah Kedoktoran Klinikal bagi Kesihatan Awam Pergigian Trinity College Dublin, University of Dublin, Ireland Emel: Majidi.Bakar@dental.tcd.ie Nombor telefon: +673-8694448
Pegawai Perlindungan Data:	Data Protection Officer Trinity College Dublin, University of Dublin, Ireland Emel: dataprotection@tcd.ie Laman sesawang: www.tcd.ie/privacy

Di bawah Peraturan Perlindungan Data Am Eropah (GDPR), jika awda tidak berpuas hati dengan cara data awda diproses, awda mempunyai hak untuk mengemukakan kebimbangan awda kepada *Office of the Data Protection Commission, 21 Fitzwilliam Square South, Dublin 2, Ireland*. Laman sesawang: www.dataprotection.ie.

Adakah saya akan dihubungi lagi?

Kami akan menghubungi awda lagi sekiranya terdapat sebarang kehilangan dokumen dan data penting, contohnya, **Borang Kebenaran** dan juga jika awda berminat, dan terpilih, untuk ditemu bual.

Appendix 17. Consent Form (English version)

Please take this Consent Form
for your reference



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin



كمتريين كصحتين
KEMENTERIAN KESIHATAN
MINISTRY OF HEALTH

Consent Form (For Dental Health Survey)

Research title: The influence of children's dental habits on dental health and their implications for oral health strategies in Negara Brunei Darussalam

There are two sections in this form. Section 1 has a statement and asks you to put a ✓ for each statement if you 'agree'. Section 2 asks for your consent. Please select either 'yes' or 'no' to indicate your choice. Please send an email to the Principal Investigator at Majidi.Bakar@dental.tcd.ie if you have any questions for each statement. Thank you for participating.	
Section 1. General Understanding	Put a ✓ in each box if you agree
I confirm I have read and understood the Participant Information Leaflet (PIL) for the above research. The information in the PIL has fully explained to me and I have been able to ask questions via email (if any), all of which have been answered to my satisfaction.	
I know how to contact the research team if I need to.	
I understand that this research is entirely voluntary. I understand that not taking part will have no negative impact on me or my child.	
I understand that I am free to withdraw my consent for my participation and my child's participation only to the point of data analysis without having to give an explanation.	
I understand that only my child's summary result of the oral examination will be given, if I request it by emailing Majidi.Bakar@dental.tcd.ie within a maximum of four weeks following the completion of the dental examination. The summary report will then be emailed to me within two weeks after sending my request.	
I understand that myself and my child will not be paid for taking part in this research.	
I understand that I will be contacted by the research team if I am selected for an interview.	
Section 2. Consent	Put a ✓ in either 'yes' or 'no' box for each statement
I agree to take part in this research research, having been fully informed of the risks and benefits in the PIL provided to me.	Yes / No ☐ ☐
I agree for my child to take part in this research research, having been fully informed of the risks and benefits in the PIL provided to me.	Yes / No ☐ ☐
I agree to the use of information about me and my child (personal data) by the research team for this research as described in the PIL.	Yes / No ☐ ☐
I agree that information collected in this research from me and my child including information about my child's oral health can be used for future research on the area of child dental health by academic sharing.	Yes / No ☐ ☐
By signing this consent form, I agree for myself and my child [child's name: _____] to participate in the research under the conditions described above.	
_____ Father/ Mother / Guardian name	_____ Father/ Mother /Guardian's signature
_____ Date	

Appendix 18. Consent Form (Malay version)

**Sila ambil Salinan Borang ini
untuk rujukan awda**



Borang Kebenaran (Bagi Kajiselidik Kesihatan Mulut)

Tajuk kajian: Pengaruh tabiat kesihatan mulut kanak-kanak kepada kesihatan mulut dan kesannya terhadap strategi kesihatan mulut di Negara Brunei Darussalam

Terdapat dua bahagian dalam borang ini. Bahagian 1 memerlukan awda untuk menandakan dengan '✓' bagi setiap pernyataan jika awda 'bersetuju'. Bahagian 2 memerlukan awda untuk menandakan dengan '✓' pada kotak 'ya' atau 'tidak' bagi setiap pernyataan. Sila hantarkan e-mel awda kepada Ketua Pengkaji di Majidi.Bakar@dental.tcd.ie jika awda mempunyai sebarang persoalan. Terima kasih di atas penyertaan awda dan anak awda di dalam kajian ini.	
Bahagian 1. Pemahaman	Tandakan ✓ di dalam setiap kotak, jika awda bersetuju
Saya mengesahkan bahawa saya telah membaca dan memahami Risalah Maklumat bagi kajian tersebut di atas. Risalah Maklumat tersebut telah menerangkan maklumat tentang kajian ini kepada saya. Saya juga telah diberikan peluang untuk bertanyakan soalan (jika ada) melalui e-mel dan kesemua soalan saya telah dijawab dengan sempurna	
Saya tahu bagaimana untuk menghubungi pasukan penyelidik jika diperlukan	
Saya faham bahawa kajian ini adalah secara sukarela. Saya juga faham bahawa saya dan anak saya tidak akan menerima sebarang kesan negatif jika tidak mengambil bahagian	
Saya faham bahawa penyertaan anak saya adalah secara sukarela. Saya faham saya boleh menarik balik kebenaran bagi penyertaan saya dan anak saya sebelum penganalisaan/ penghuraian data dilakukan tanpa perlu memberikan sebarang ulasan	
Saya faham bahawa hanya keputusan ringkasan bagi peperiksaan mulut anak saya yang akan diberikan, jika saya memintanya dengan menghantarkan e-mel kepada Majidi.Bakar@dental.tcd.ie dalam tempoh maksima 4 minggu setelah peperiksaan mulut dilaksanakan. Laporan ringkasan kemudiannya akan dihantar kepada saya melalui e-mel dalam masa 2 minggu setelah menghantar permintaan saya	
Saya faham bahawa saya dan anak saya tidak akan menerima sebarang bayaran dalam kajian ini	
Saya faham bahawa saya akan dihubungi oleh pasukan kajiselidik, jika sekiranya ada dokumen/ data yang hilang dan jika saya berminat dan terpilih untuk ditemuduga	
Bahagian 2. Kebenaran	Tandakan ✓ pada kotak 'ya' atau 'tidak' bagi setiap pernyataan
Saya bersetuju untuk saya dan anak saya mengambil bahagian dalam kajian ini, setelah dimaklumkan sepenuhnya tentang risiko dan faedah kajian ini di dalam Risalah Maklumat	Ya / Tidak ☐ ☐
Saya bersetuju dengan penggunaan maklumat peribadi saya dan anak saya oleh pasukan kajiselidik untuk kajian ini	Ya / Tidak ☐ ☐
Saya bersetuju bahawa maklumat tentang kesihatan mulut anak saya (tidak termasuk maklumat peribadi saya dan anak saya) yang dikumpulkan dalam kajian ini boleh digunakan untuk kajian kesihatan mulut di masa hadapan melalui perkongsian akademik	Ya / Tidak ☐ ☐
Dengan menandatangani borang kebenaran ini, saya bersetuju untuk saya dan anak saya [nama anak: _____] menyertai kajian ini dengan syarat-syarat yang dinyatakan di atas.	
_____ Nama ibu/ bapa /penjaga	_____ Tandatangan ibu/ bapa /penjaga
_____ Tarikh	

Appendix 19. Parental Questionnaire (English version)

**Put this Consent Form in the
envelope after it is completed**



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin



كمنترین كصیحتن
KEMENTERIAN KESIHATAN
MINISTRY OF HEALTH

Questionnaire (For Dental Health Survey)

(Please fill in this Questionnaire Form if you give consent for your child's participation)

Your child's name:	

Medical History						
A)	Does your child have or ever had any of the medical problems listed below? (Please tick 'Yes' or 'No' for each problem)					
		Yes	No		Yes	No
	Heart complaint, valve disorder, e.g. murmur	☐	☐	Epilepsy, fits, convulsion	☐	☐
	Tuberculosis (TB)	☐	☐	Asthma, breathlessness	☐	☐
	High blood pressure	☐	☐	Diabetes	☐	☐
	Anaemia or other blood diseases	☐	☐	Mental disorders	☐	☐
B)	Please list any other medical problem/ disease: _____					
C)	Please list any medicines, prescribed by a doctor, your child is taking or using at present: _____					
D)	Please list any drugs or medicines your child is allergic to: _____					
E)	Please list any other allergies (including latex): _____					

Section 1: Your child's dental health		
1)	Overall, would you say that the health of your child's teeth and mouth is ...	<i>(Tick one box only)</i> ☐ Very good ☐ Good ☐ Poor ☐ Very poor

Section 2: Dental hygiene habits														
These questions are about cleaning your child's teeth														
2)	How old was your child when they started brushing their teeth or having them brushed for them?	<i>(Tick one box only)</i> ☐ 6 month or below → Go to Q3 ☐ Between 6 months and 1 year → Go to Q3 ☐ Between 1 and 2 years → Go to Q3 ☐ Between 2 and 4 years → Go to Q3 ☐ 4 years or older → Go to Q8 ☐ My child does not brush teeth or have them brushed for them												
		<table border="1"> <thead> <tr> <th>AT AGE 2-3 YEARS</th> <th>NOW</th> </tr> </thead> <tbody> <tr> <td><i>(Tick one box only)</i></td> <td><i>(Tick one box only)</i></td> </tr> <tr> <td>☐ Less than once a day</td> <td>☐ Less than once a day</td> </tr> <tr> <td>☐ Once a day</td> <td>☐ Once a day</td> </tr> <tr> <td>☐ Twice a day</td> <td>☐ Twice a day</td> </tr> <tr> <td>☐ More than twice a day</td> <td>☐ More than twice a day</td> </tr> </tbody> </table>	AT AGE 2-3 YEARS	NOW	<i>(Tick one box only)</i>	<i>(Tick one box only)</i>	☐ Less than once a day	☐ Less than once a day	☐ Once a day	☐ Once a day	☐ Twice a day	☐ Twice a day	☐ More than twice a day	☐ More than twice a day
AT AGE 2-3 YEARS	NOW													
<i>(Tick one box only)</i>	<i>(Tick one box only)</i>													
☐ Less than once a day	☐ Less than once a day													
☐ Once a day	☐ Once a day													
☐ Twice a day	☐ Twice a day													
☐ More than twice a day	☐ More than twice a day													
3)	How often does your child usually brush their teeth (or have them brushed for them)?													
4)	Who usually brushes your child's teeth nowadays?	<i>(Tick one box only)</i> ☐ Your child ☐ An adult ☐ An adult and your child together												
5)	What is the name of the toothpaste your child is currently using? (e.g. Colgate, Pepsodent, Oral B)	<i>(Please write the brand name of the toothpaste in the box)</i> 												
6)	How much toothpaste does your child (or do you) usually use on his/her toothbrush?	<i>(Tick one box only)</i> ☐  ☐  ☐ 												
7)	After tooth brushing, does your child usually ...	<i>(Tick one box only)</i> ☐ Just swallow ☐ Rinse and swallow ☐ Rinse and spit ☐ Just spit												

Section 3: Breastfeeding and dietary intake	
These questions are about what your child eat and drink	
8) Please indicate the type of milk your child consumed from birth to 6 months of age	<i>(Tick one box only)</i> ☐ Breast milk ☐ Formula milk ☐ Breast milk and formula milk
9) Please indicate the type of milk your child consumed from 6 to 12 months of age	<i>(Tick one box only)</i> ☐ Breast milk ☐ Formula milk ☐ Breast milk and formula milk
10) Please indicate the type of milk your child consumed from 12 to 24 months of age	<i>(Tick one box only)</i> ☐ Breast milk ☐ Formula milk ☐ Breast milk and formula milk
11) Estimate at what age your child stopped receiving breast milk	<i>(Tick one box only)</i> ☐ Never had breast milk ☐ Less than 12 months old ☐ 12 months to less than 2 years old ☐ More than 2 years old

12) How many times a day does your child usually eat the following food:

(Tick one box on each row)

	Four or more times a day	Three times a day	Two times a day	Once a day	None per day	Rarely or never
a) Fruit (fresh, canned, dried and frozen)	☐	☐	☐	☐	☐	☐
b) Cakes, biscuits or pudding	☐	☐	☐	☐	☐	☐
c) Sweets (candy or chocolate)	☐	☐	☐	☐	☐	☐
d) Ice-cream, sweetened yoghurt	☐	☐	☐	☐	☐	☐
e) Syrups, jams and sweet spreads (e.g. Nutella, honey, condensed milk)	☐	☐	☐	☐	☐	☐

13) How many times a day does your child usually drink the following drinks:

(Tick one box on each row)

	Four or more times a day	Three times a day	Two times a day	Once a day	None per day	Rarely or never
a) Diet coke or non-sugar drinks	☐	☐	☐	☐	☐	☐
b) Coke or other soft drinks that contain sugar	☐	☐	☐	☐	☐	☐
c) Water (tap or bottled)	☐	☐	☐	☐	☐	☐
d) Fruit juice and smoothies	☐	☐	☐	☐	☐	☐
e) Sweetened condensed milk	☐	☐	☐	☐	☐	☐
f) Milo, vico, ovaltine and others	☐	☐	☐	☐	☐	☐
g) Yakult, vitagen or others	☐	☐	☐	☐	☐	☐

Section 4: Use of Dental Services

The following questions concern your child's use of dental care services

14)	How old was your child when he/ she FIRST visited a dentist or dental nurse for dental check-up (not including emergency visit due to pain) for his/ her own oral health?	(Tick one box only) ☐ Under 1 year old ☐ 1 year old ☐ 2 years old ☐ 3 to 5 years old ☐ Never visited for a dental check-up
15)	When did your child LAST see a dentist or dental nurse for his/ her oral health?	(Tick one box only) ☐ Less than 12 months ago ☐ 12 months to 24 months ago ☐ More than 24 months
16)	How often does your child visit a dentist or dental nurse for dental care?	(Tick one box only) ☐ Twice a year ☐ Once a year ☐ Once every 2 years ☐ No regular pattern ☐ No visit in the past 2 years

Section 5: Characteristics of the Households										
The following questions are about your household. These questions will help to decide if different methods of preventing dental problems are equally effective for all groups within the community. This will ensure that the researchers obtain accurate information on all households										
17)	To what ethnic group does your child belong? (Tick one box only)	☐ Brunei Malay (Brunei, Tutong, Belait, Temburong) ☐ Other Brunei Malay (Dusun, Bisaya, Murut, Kedayan) ☐ Other Indigenous (Iban, Punan, Kelabit) ☐ Chinese ☐ Other:								
18) If your child lives in a one-parent household, please fill in one column for yourself . If he/ she lives in a two-parent household, please fill in both columns for yourself and your spouse .										
		<table border="1"> <thead> <tr> <th>Father/ Mother / Guardian (A)</th> <th>Father/ Mother/ Guardian (B)</th> </tr> </thead> <tbody> <tr> <td> (Tick one box only) ☐ No formal education ☐ Primary 1-6 ☐ Form 1-5 ☐ Technical or Vocational/ National Diploma ☐ A' level/ HND ☐ Bachelor's Degree ☐ Master's Degree/ Postgraduate Certificate/ Postgraduate Diploma ☐ PhD or higher </td> <td> (Tick one box only) ☐ No formal education ☐ Primary 1-6 ☐ Form 1-5 ☐ Technical or Vocational/ National Diploma ☐ A' level/ HND ☐ Bachelor's Degree ☐ Master's Degree/ Postgraduate Certificate/ Postgraduate Diploma ☐ PhD or higher </td> </tr> <tr> <td> (Tick one box only) ☐ Full-time employment ☐ Part-time employment ☐ Currently not working </td> <td> (Tick one box only) ☐ Full-time employment ☐ Part-time employment ☐ Currently not working </td> </tr> <tr> <td> (Tick one box only) ☐ Less than B\$1,000 ☐ B\$1,000 – 1,999 ☐ B\$2,000 – 2,999 ☐ B\$3,000 – 3,999 ☐ B4,000 and above ☐ Not applicable </td> <td></td> </tr> </tbody> </table>	Father/ Mother / Guardian (A)	Father/ Mother/ Guardian (B)	(Tick one box only) ☐ No formal education ☐ Primary 1-6 ☐ Form 1-5 ☐ Technical or Vocational/ National Diploma ☐ A' level/ HND ☐ Bachelor's Degree ☐ Master's Degree/ Postgraduate Certificate/ Postgraduate Diploma ☐ PhD or higher	(Tick one box only) ☐ No formal education ☐ Primary 1-6 ☐ Form 1-5 ☐ Technical or Vocational/ National Diploma ☐ A' level/ HND ☐ Bachelor's Degree ☐ Master's Degree/ Postgraduate Certificate/ Postgraduate Diploma ☐ PhD or higher	(Tick one box only) ☐ Full-time employment ☐ Part-time employment ☐ Currently not working	(Tick one box only) ☐ Full-time employment ☐ Part-time employment ☐ Currently not working	(Tick one box only) ☐ Less than B\$1,000 ☐ B\$1,000 – 1,999 ☐ B\$2,000 – 2,999 ☐ B\$3,000 – 3,999 ☐ B4,000 and above ☐ Not applicable	
Father/ Mother / Guardian (A)	Father/ Mother/ Guardian (B)									
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(Tick one box only) ☐ Full-time employment ☐ Part-time employment ☐ Currently not working	(Tick one box only) ☐ Full-time employment ☐ Part-time employment ☐ Currently not working									
(Tick one box only) ☐ Less than B\$1,000 ☐ B\$1,000 – 1,999 ☐ B\$2,000 – 2,999 ☐ B\$3,000 – 3,999 ☐ B4,000 and above ☐ Not applicable										
a)	What is the highest level of education you have? (Tick one box only)									
b)	What is your current employment status? (Tick one box only)									
c)	What are your household income per month? Include any salaries, pensions, allowances, benefits, etc from all person in the household									

Your comment
Thank you for your cooperation. Your contribution to this study is greatly appreciated. Please take a moment to check that you have answered each question and have signed the consent form, then return the completed questionnaire and consent form to the focal person of your child's school. If you have any comment, please feel free to write them in the space below.

Interested in an interview?	
The aim of the interview will be to understand the views of parents/guardians of 5-year-old children in Brunei Darussalam with respect to the oral health-related behaviours related to their oral health needs. If you are selected for the interview, you will be contacted by the research team	
Are you interested in an interview (face-to-face or online) at a later date?	<i>(Tick one box only)</i> ☐ Yes ☐ No <i>(Please indicate your contact number here)</i> _____ <i>(Please indicate your email address here)</i> _____

Appendix 20. Parental Questionnaire (Malay version)

Masukkan Borang ini ke dalam sampul
setelah diisi dengan lengkap



Borang Soal Selidik (Bagi Kajiselidik Kesihatan Mulut)

(Sila isikan Borang Soal Selidik ini jika awda membenarkan anak awda untuk mengambil bahagian)

Nama anak awda:																																			
Sejarah Kesihatan																																			
A)	Adakah anak awda sedang atau pernah menghidap masalah kesihatan yang tersenarai di bawah? (Sila tandakan ✓ pada kotak 'Ya' atau 'Tidak' bagi setiap masalah) <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;"></th> <th style="width: 10%; text-align: center;">Ya</th> <th style="width: 10%; text-align: center;">Tidak</th> <th style="width: 40%;"></th> <th style="width: 10%; text-align: center;">Ya</th> <th style="width: 10%; text-align: center;">Tidak</th> </tr> </thead> <tbody> <tr> <td>Masalah jantung, penyakit injap seperti 'murmur'</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> <td>Epilepsi (Sawan)</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> </tr> <tr> <td>Tuberkulosis/ Tibi/ Batuk Kering</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> <td>Asma (ampus), sesak nafas</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> </tr> <tr> <td>Tekanan darah tinggi</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> <td>Kencing manis</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> </tr> <tr> <td>Anemia (kurang darah) atau penyakit darah yang lain</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> <td>Kecelaruhan mental</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> </tr> </tbody> </table>						Ya	Tidak		Ya	Tidak	Masalah jantung, penyakit injap seperti 'murmur'	☐	☐	Epilepsi (Sawan)	☐	☐	Tuberkulosis/ Tibi/ Batuk Kering	☐	☐	Asma (ampus), sesak nafas	☐	☐	Tekanan darah tinggi	☐	☐	Kencing manis	☐	☐	Anemia (kurang darah) atau penyakit darah yang lain	☐	☐	Kecelaruhan mental	☐	☐
	Ya	Tidak		Ya	Tidak																														
Masalah jantung, penyakit injap seperti 'murmur'	☐	☐	Epilepsi (Sawan)	☐	☐																														
Tuberkulosis/ Tibi/ Batuk Kering	☐	☐	Asma (ampus), sesak nafas	☐	☐																														
Tekanan darah tinggi	☐	☐	Kencing manis	☐	☐																														
Anemia (kurang darah) atau penyakit darah yang lain	☐	☐	Kecelaruhan mental	☐	☐																														
B)	Sila senaraikan sebarang masalah kesihatan/ penyakit yang lain:																																		
C)	Sila senaraikan sebarang ubat yang diberi oleh doktor yang diambil atau digunakan oleh anak awda pada masa ini:																																		
D)	Sila senaraikan sebarang ubat yang menyebabkan alahan/ alergik pada anak awda:																																		
E)	Sila senaraikan alahan-alahan lain (termasuk getah lateks):																																		

Bahagian 1: Kesihatan Pergigian Anak Awda		
1)	Bagaimanakah kesihatan mulut dan gigi anak awda secara keseluruhannya?	(Tandakan ✓ satu kotak sahaja) ☐ Sangat baik ☐ Baik ☐ Memuaskan ☐ Tidak memuaskan
Bahagian 2: Tabiat Kebersihan Gigi		
Soalan berikut adalah mengenai penjagaan kebersihan gigi anak awda		
2)	Berapakah umur anak awda mula memberus gigi sendiri atau diberuskan?	(Tandakan ✓ satu kotak sahaja) ☐ 6 bulan atau ke bawah → Terus ke soalan 3 ☐ Antara umur 6 bulan dan 1 tahun → Terus ke soalan 3 ☐ Antara umur 1 dan 2 tahun → Terus ke soalan 3 ☐ Antara umur 2 dan 4 tahun → Terus ke soalan 3 ☐ 4 tahun ke atas → Terus ke soalan 3 ☐ Anak saya tidak memberus gigi sendiri atau tidak diberuskan → Terus ke soalan 8
3)	Berapa kerapkah anak awda biasanya memberus gigi sendiri (atau diberuskan)?	PADA UMUR 2-3 TAHUN (Tandakan ✓ satu kotak sahaja) ☐ Kurang daripada sekali sehari ☐ Sekali sehari ☐ Dua kali sehari ☐ Lebih daripada dua kali sehari
		SEKARANG (Tandakan ✓ satu kotak sahaja) ☐ Kurang daripada sekali sehari ☐ Sekali sehari ☐ Dua kali sehari ☐ Lebih daripada dua kali sehari
4)	Siapakah yang biasanya memberus gigi anak awda?	(Tandakan ✓ satu kotak sahaja) ☐ Anak awda sendiri ☐ Orang dewasa ☐ Orang dewasa dan anak awda bersama-sama
5)	Apakah nama ubat gigi yang anak awda gunakan sekarang? (Contoh: Colgate, Pepsodent, Oral B)	(Sila nyatakan jenama ubat gigi dalam petak ini)
6)	Berapa banyakkah ubat gigi yang biasanya anak awda (atau awda) gunakan pada berus giginya?	(Tandakan ✓ satu kotak sahaja) ☐  ☐  ☐ 
7)	Selepas memberus gigi, adakah anak awda selalu...	(Tandakan ✓ satu kotak sahaja) ☐ Telan sahaja ☐ Kumur dan telan ☐ Kumur dan ludah ☐ Ludah sahaja

Bahagian 3: Penyusuan Susu Ibu dan Pengambilan Makanan	
Soalan berikut adalah mengenai apa yang anak awda makan dan minum.	
8) Sila nyatakan jenis susu yang anak awda minum sejak lahir hingga berumur 6 bulan	<i>(Tandakan ✓ satu kotak sahaja)</i> ☐ Susu ibu ☐ Susu formula ☐ Susu ibu dan susu formula
9) Sila nyatakan jenis susu anak awda minum dari umur 6 hingga 12 bulan	<i>(Tandakan ✓ satu kotak sahaja)</i> ☐ Susu ibu ☐ Susu formula ☐ Susu ibu dan susu formula
10) Sila nyatakan jenis susu anak awda minum dari umur 12 hingga 24 bulan	<i>(Tandakan ✓ satu kotak sahaja)</i> ☐ Susu ibu ☐ Susu formula ☐ Susu ibu dan susu formula
11) Anggaran pada umur berapakah anak awda berhenti menerima susu ibu	<i>(Tandakan ✓ satu kotak sahaja)</i> ☐ Tidak pernah menerima ☐ Kurang dari 12 bulan ☐ 12 bulan hingga kurang dari 2 tahun ☐ Lebih dari 2 tahun

12) Berapa kali sehari anak awda biasanya makan makanan berikut:

(Tandakan ✓ satu kotak pada setiap barisan)

	Empat kali atau lebih dalam sehari	Tiga kali sehari	Dua kali sehari	Sekali sehari	Tiada dalam sehari	Jarang atau tidak Pernah
a) Buah-buahan (segar, dalam tin, kering dan beku)	☐	☐	☐	☐	☐	☐
b) Kek, biskut atau puding	☐	☐	☐	☐	☐	☐
c) Makanan manis (Gula-gula atau coklat)	☐	☐	☐	☐	☐	☐
d) Ais krim, yogurt manis	☐	☐	☐	☐	☐	☐
e) Sirap, jem dan lepa manis (seperti Nutella, madu, susu pekat manis)	☐	☐	☐	☐	☐	☐

13) Berapa kali sehari anak awda biasanya minum minuman berikut:

(Tandakan ✓ satu kotak pada setiap barisan)

	Empat kali atau lebih dalam sehari	Tiga kali sehari	Dua kali sehari	Sekali sehari	Tiada dalam sehari	Jarang atau tidak pernah
a) Diet coke atau minuman tanpa gula	☐	☐	☐	☐	☐	☐
b) Coke atau minuman ringan lain yang mengandungi gula	☐	☐	☐	☐	☐	☐
c) Air (paip atau botol)	☐	☐	☐	☐	☐	☐
d) Jus buah-buahan atau minuman campuran (smoothie)	☐	☐	☐	☐	☐	☐
e) Susu pekat manis	☐	☐	☐	☐	☐	☐
f) Milo, Vico, Ovaltine dan lain-lain	☐	☐	☐	☐	☐	☐
g) Minuman probiotik (Contoh Yakult, Vitagen atau lain-lain)	☐	☐	☐	☐	☐	☐

Bahagian 4: Penggunaan Perkhidmatan Pergigian		
Soalan berikut berkenaan dengan penggunaan perkhidmatan rawatan pergigian anak awda		
14)	Berapakah umur anak awda PERTAMA kali berjumpa dengan doktor gigi atau jururawat pergigian untuk pemeriksaan gigi (tidak termasuk lawatan kecemasan disebabkan oleh sakit) bagi kesihatan mulut anak awda?	(Tandakan ✓ satu kotak sahaja) ☐ Di bawah 1 tahun ☐ 1 tahun ☐ 2 tahun ☐ 3 hingga 5 tahun ☐ Tidak pernah berjumpa untuk pemeriksaan gigi
15)	Bilakah kali TERAKHIR anak awda berjumpa dengan doktor gigi atau jururawat pergigian untuk kesihatan mulut anak awda?	(Tandakan ✓ satu kotak sahaja) ☐ Kurang daripada 12 bulan yang lalu ☐ 12 bulan hingga 24 bulan yang lalu ☐ Lebih daripada 24 bulan
16)	Berapa kerapkah anak awda berjumpa doktor gigi atau jururawat pergigian untuk rawatan pergigian?	(Tandakan ✓ satu kotak sahaja) ☐ Dua kali setahun ☐ Setahun sekali ☐ Sekali setiap 2 tahun ☐ Tidak ada tempoh tetap ☐ Tidak ada perjumpaan dalam tempoh 2 tahun kebelakangan

Bahagian 5: Ciri Rumah Tangga										
Soalan berikut adalah tentang isi rumah awda. Soalan ini akan membantu untuk membuat keputusan jika kaedah yang berbeza untuk mencegah masalah pergigian adalah sama berkesan bagi semua kumpulan dalam komuniti/ masyarakat tersebut. Ini akan memastikan penyelidik mendapatkan maklumat yang tepat mengenai semua isi rumah.										
17)	Anak awda tergolong dalam kumpulan etnik apa?	(Tandakan ✓ satu kotak sahaja) ☐ Melayu Brunei (Brunei, Tutong, Belait, Temburong) ☐ Melayu Brunei yang lain (Dusun, Bisaya, Murut, Kedayan) ☐ Puak asli yang lain (Iban, Punan, Kelabit) ☐ Cina ☐ Lain-lain:								
18) Jika anak awda tinggal bersama ibu atau bapa sahaja, sila isikan satu ruangan untuk diri awda sahaja . Jika anak awda tinggal bersama kedua ibu bapa, sila isikan kedua-dua ruangan untuk diri awda dan pasangan awda .										
		<table border="1"> <thead> <tr> <th>Ibu atau bapa atau Penjaga (A)</th> <th>Ibu atau bapa atau Penjaga (B)</th> </tr> </thead> <tbody> <tr> <td> a) Apakah tahap pendidikan tertinggi awda? (Tandakan ✓ satu kotak sahaja) ☐ Tidak ada pendidikan formal ☐ Darjah 1-6 ☐ Tingkatan 1-5 ☐ Teknikal atau Vokasional/ Diploma Kebangsaan ☐ Peringkat A' / HND ☐ Ijazah Sarjana Muda ☐ Ijazah Sarjana/ Sijil Lulusan Ijazah/ Diploma Lulusan Ijazah ☐ Doktor Falsafah atau lebih </td> <td> (Tandakan ✓ satu kotak sahaja) ☐ Tiada pendidikan formal ☐ Darjah 1-6 ☐ Tingkatan 1-5 ☐ Teknikal atau Vokasional/ Diploma Kebangsaan ☐ Peringkat A' / HND ☐ Ijazah Sarjana Muda ☐ Ijazah Sarjana/Sijil Lulusan Ijazah/ Diploma Lulusan Ijazah ☐ Doktor Falsafah atau lebih </td> </tr> <tr> <td> b) Apakah status pekerjaan awda sekarang? (Tandakan ✓ satu kotak sahaja) ☐ Pekerjaan sepenuh masa ☐ Pekerjaan sambilan ☐ Tidak bekerja </td> <td> (Tandakan ✓ satu kotak sahaja) ☐ Pekerjaan sepenuh masa ☐ Pekerjaan sambilan ☐ Tidak bekerja </td> </tr> <tr> <td> c) Berapakah jumlah pendapatan bulanan seisi rumah awda? (Termasuk apa-apa gaji, pencen, elaun, faedah dan lain-lain daripada semua ahli isi rumah) (Tandakan ✓ satu kotak sahaja) ☐ Kurang daripada B\$1,000 ☐ B\$1,000 – B\$1,999 ☐ B\$2,000 – B\$2,999 ☐ B\$3,000 – B\$3,999 ☐ B\$4,000 ke atas ☐ Tidak berkenaan </td> <td></td> </tr> </tbody> </table>	Ibu atau bapa atau Penjaga (A)	Ibu atau bapa atau Penjaga (B)	a) Apakah tahap pendidikan tertinggi awda? (Tandakan ✓ satu kotak sahaja) ☐ Tidak ada pendidikan formal ☐ Darjah 1-6 ☐ Tingkatan 1-5 ☐ Teknikal atau Vokasional/ Diploma Kebangsaan ☐ Peringkat A' / HND ☐ Ijazah Sarjana Muda ☐ Ijazah Sarjana/ Sijil Lulusan Ijazah/ Diploma Lulusan Ijazah ☐ Doktor Falsafah atau lebih	(Tandakan ✓ satu kotak sahaja) ☐ Tiada pendidikan formal ☐ Darjah 1-6 ☐ Tingkatan 1-5 ☐ Teknikal atau Vokasional/ Diploma Kebangsaan ☐ Peringkat A' / HND ☐ Ijazah Sarjana Muda ☐ Ijazah Sarjana/Sijil Lulusan Ijazah/ Diploma Lulusan Ijazah ☐ Doktor Falsafah atau lebih	b) Apakah status pekerjaan awda sekarang? (Tandakan ✓ satu kotak sahaja) ☐ Pekerjaan sepenuh masa ☐ Pekerjaan sambilan ☐ Tidak bekerja	(Tandakan ✓ satu kotak sahaja) ☐ Pekerjaan sepenuh masa ☐ Pekerjaan sambilan ☐ Tidak bekerja	c) Berapakah jumlah pendapatan bulanan seisi rumah awda? (Termasuk apa-apa gaji, pencen, elaun, faedah dan lain-lain daripada semua ahli isi rumah) (Tandakan ✓ satu kotak sahaja) ☐ Kurang daripada B\$1,000 ☐ B\$1,000 – B\$1,999 ☐ B\$2,000 – B\$2,999 ☐ B\$3,000 – B\$3,999 ☐ B\$4,000 ke atas ☐ Tidak berkenaan	
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c) Berapakah jumlah pendapatan bulanan seisi rumah awda? (Termasuk apa-apa gaji, pencen, elaun, faedah dan lain-lain daripada semua ahli isi rumah) (Tandakan ✓ satu kotak sahaja) ☐ Kurang daripada B\$1,000 ☐ B\$1,000 – B\$1,999 ☐ B\$2,000 – B\$2,999 ☐ B\$3,000 – B\$3,999 ☐ B\$4,000 ke atas ☐ Tidak berkenaan										

Komen Awda
Terima kasih atas kerjasama awda. Sumbangan awda dalam kajian ini amatlah dihargai. Sila luangkan sedikit masa untuk memastikan awda telah menjawab setiap soalan dan telah menandatangani Borang Kebenaran, kemudian kembalikan Borang Soal Selidik ini dan Borang Kebenaran yang lengkap kepada guru tumpuan (<i>focal teacher</i>) di sekolah anak awda. Jika awda mempunyai sebarang komen, sila tulis dalam ruangan di bawah.

Berminat untuk ditemu bual?	
Matlamat temu bual ini adalah untuk memahami pandangan ibu bapa kepada kanak-kanak yang berumur 5 tahun di Negara Brunei Darussalam mengenai tabiat kesihatan mulut yang berkaitan dengan keperluan kesihatan mulut mereka. Jika awda terpilih untuk ditemu bual, awda akan dihubungi oleh pasukan penyelidik.	
Adakah awda berminat untuk ditemu bual (secara bersemuka atau dalam talian) di kemudian hari?	(Tandakan ✓ satu kotak sahaja) ☐ Ya ☐ Tidak (Sila nyatakan nombor telefon yang mudah untuk dihubungi di sini) (Sila nyatakan alamat e-mel awda di sini)

Appendix 21. Malay version of the Letter to cross-check the Malay-English translation of the validated questionnaire



**SEBUT HARGA BAYARAN
KHIDMAT PENTERJEMAHAN/PENYEMAKAN PENTERJEMAHAN,
UNIT PENTERJEMAHAN,
BAHAGIAN PEMBINAAN DAN PENGEMBANGAN BAHASA,
DEWAN BAHASA DAN PUSTAKA**

Merujuk permohonan pihak Tuan bertarikh **18 Mac 2023** mengenai permohonan penyemakan penterjemahan. Sukacita dimaklumkan bahawa Unit Penterjemahan, Bahagian Pembinaan dan Pengembangan Bahasa akan mengenakan bayaran bagi khidmat penterjemahan seperti yang berikut:

Pemohon:
Dr. Haji Majidi bin Haji Awang Bakar

TAJUK DOKUMEN	JUMLAH PERKATAAN	BAYARAN
1. Questionnaire	1203 patah perkataan	\$60.15
2. Interview Schedules	309 patah perkataan	\$15.45
JUMLAH		\$75.60

Sehubungan dengan itu, sukacita memaklumkan bahawa pembayaran bolehlah dibuat seperti berikut:

i. Secara Tunai

Pembayaran deposit sekurang-kurangnya 50% atau penuh hendaklah dibuat di Unit Kewangan, Tingkat 4, Dewan Bahasa dan Pustaka (DBP), Lapangan Terbang Lama, Berakas, dengan membawa sebut harga yang telah dihantar sebelumnya, dan salinan resit pembayaran hendaklah dihantar ke Unit Penterjemahan, Bahagian Pembinaan dan Pengembangan Bahasa, Tingkat 3, DBP; atau

ii. BIBD QuickPay (Kod QR dilampirkan bersama)

Sila gambar resit dan kod pengesahan setelah membuat pembayaran, dan e-melkan kembali bukti pembayaran ke unit.terjemahandbp@dbp.gov.bn dan salinan kepada (c.c.) ke revenue@dbp.gov.bn, umar.bujang@kkbs.gov.bn, fikri.tuah@dbp.gov.bn

Jika pihak Tuan bersetuju dengan sebut harga ini, pembayaran hendaklah dijelaskan seberapa segera dengan cara-cara pembayaran seperti yang dinyatakan di atas dalam tempoh **14 hari waktu bekerja**. Jika sekiranya pihak kami tidak menerima sebarang respons, bererti pihak Tuan tidak berminat untuk meneruskan permohonan ini.

Untuk sebarang pertanyaan, pihak Tuan bolehlah menghubungi talian **2382511 samb. 130 dan 133**.

Sekian dimaklumkan untuk tindakan pihak Tuan selanjutnya.

Siti Nurfatin Sumarni Binti Haji Sulaiman
Pemangku Ketua Penterjemah,
Unit Penterjemahan,
Bahagian Pembinaan dan Pengembangan Bahasa,
Dewan Bahasa dan Pustaka
Lapangan Terbang Lama Berakas BB3510
Negara Brunei Darussalam
Tel: **2382511 samb. 130 dan 133**.

Bil: **07/DBP/P74/B2/UP/8/2023**

Tarikh sebut harga: **22 Mac 2023**

Appendix 22. Clinical Examination Manual for 5-year-old children in Brunei Darussalam



Clinical Examination Manual for 5-year-old children in Brunei Darussalam

Version 1

July to September 2023

1. Introduction

In order to understand how a range of oral health related-behaviours, from birth to the age of 5 years, influence oral health status of children, the principal investigator has decided to conduct a research study entitled '*The associations between early-life behaviours, current oral health behaviours and oral health among children in Brunei Darussalam and their implications for oral health prevention strategies*'. As part of this research study, in collaboration with Dublin Dental University Hospital (DDUH), Trinity College Dublin, Ireland and Department of Dental Services, Ministry of Health of Brunei Darussalam, the principal investigator will conduct an oral epidemiological study focusing on children in Brunei Darussalam aged 5-year-old using the modified protocol from the British Association for the Study of Community Dentistry (BASCD). This protocol will allow for running a parallel survey of 5-year school children attending both the government and private schools in Brunei Darussalam.

2. Aim of the survey

The aims of the survey are:

- to assess the associations between early-life oral health behaviours and prevalence/severity of caries experience in the primary dentition of 5-year-old children in Brunei Darussalam
- to assess the associations between current oral health behaviours and prevalence/severity of caries experience in the primary dentition of 5-year-old children
- to identify the oral health strategies and policies that will be implemented in Brunei Darussalam for the young children population in the future

3. Objectives of the survey

The aims of this study will be achieved by conducting a clinical epidemiological survey in Brunei Darussalam on a sample of 5-year-old children that:

- provide accurate information regarding the prevalence and severity of decayed, missing and filled teeth (dmft) in the deciduous dentition of schoolchildren
- assess the effects of early-life oral health behaviours on dental caries risk
- assess the effects of current oral health behaviours on dental caries risk

4. Methods of the survey

The epidemiological survey is a cross-sectional study from a random sample of 5-year-old children in Brunei Darussalam. A two-stage sampling will be implemented in order to reach a representative sample of Bruneian children with the specified age group.

4.1 Survey population

The population of the survey will be those children, called participants, aged 5 years attending both government and private primary schools within the most populated district in Brunei Darussalam called Brunei Muara. The ages of these children must be 5 years and has not reach their 6th birthdays on the day of the dental examination.

4.2 Sample strategy and size

This oral epidemiological study followed sampling guidance from the British Association for the Study of Community Dentistry, BASCD [4]. The sample size was determined by maximising the size required for examining dmft in 5-year-old children. Based on the enrolled population of 5-year-olds in Brunei-Muara District in 2018, totalling 4,888 children and considering data from the latest National Oral Health Survey conducted in 2017, the following parameters were considered: a prevalence of dmft greater than zero at 74.1%, a precision of 5%, a design effect of 1.3 (due to cluster sampling) and an additional 20% for possible non-responses. The minimum sample size required was estimated to be 335 children aged five years.

5. Purpose of this protocol

This new protocol will give a descriptive manual of the standardised methods implemented by all survey teams when undertaking the survey throughout Brunei Darussalam. The manual also consists of procedures for dental examination, diagnostic coding systems and diagnostic criteria to be implemented in the dental survey.

5.1. Responsibilities

The following staff from the Department of Dental Services, Brunei Darussalam, assisted with the study activities (Table 1):

Table 1. List of staff involved in the data collection activities in Brunei Darussalam

No.	Name	Job position in Brunei Darussalam	Task during study activity
1.	Dr Rizan Mohamed	Senior Dental Officer and Head of Dental Public Health Unit	Clinical Supervisor
2.	Zulhafiy Yusran	Dental Hygienist and Therapist	Dental examiner 2
3.	Aimi Lutfi	Dental Hygienist and Therapist	Dental recorder 1
4.	Syahnurul Abdu'rrahman	Dental Nursing Officer	Dental recorder 2
5.	Jafar Jamil	Dental Staff Nurse	Dental Helper
6.	Malinah Samat	Deputy Medical Record Officer	Administration

The personnel and TCD study team members involved in this study have completed an assessed online training module titled 'Data Protection, IT Security and Data Management,' as required by the Faculty of Health Sciences Study Ethics Committee (FHS REC) in TCD. Please refer to the following documents regarding their participation in this study:

- Curriculum vitae of each study team member
- Delegation log containing the list of names of individuals involved in each task during the study

5.1.1. Principal investigator

Under the supervision of Co-investigators and Clinical Supervisor, the principal investigator was responsible for:

- planning the dental survey and ensuring the quality of the resulting datasets
- ensuring the design of the dental survey met appropriate professional and ethical standards
- Translating the Participant Information Leaflets, Consent forms and Questionnaires, as Malay is Brunei Darussalam's official language.
 - The Malay version of PILs and Consent forms were cross-checked and verified by Dr Haji Rizan (Clinical Supervisor, who was also the Head of the Study and Development Unit, Department of Dental Services)
 - The Malay version of validated Questionnaires was cross-checked by Dewan Bahasa dan Pustaka, the Language and Literature Bureau, in Brunei Darussalam
- piloting the PILs, consent forms and validated questionnaires on at least five parents of children from different socioeconomic groups in Brunei Darussalam to determine the appropriateness of the content, language, presentation, clarity and respondent burden and minor changes were made if required

5.1.2. Survey administration team

Staff involved: Dr Majidi and Malinah Samat

Once the random sampling procedure was completed, the administration team informed the head teachers with the help of a support letter or email with a summarised explanation in more detail about the purpose and nature of the survey. The letter briefly explained that the dental examinations would be simple and visual (non-invasive). As the team members had been dealing with and treating child patients as their daily job for many years, no discomfort or distress to the children occurred. The head teachers were contacted to seek cooperation with agreed dates, times, appropriate locations for dental examinations and requested class lists.

The survey administration team sent out survey packs (each labelled with a unique child identification number) containing participant information leaflets, consent forms and questionnaires for completion by the participant's parent or guardian to all sampled children. In simple language, these documents explained the survey rationale, provided details concerning the conduct of the clinical examination and outlined how the data collected would be used. A second wave of survey packs was distributed to those who failed to respond to the initial contact. Once the schedule of the dental examination was agreed upon, the administration team notified the survey logistic team regarding the dates of the dental examination sessions and the school locations.

Once the schedule of dental examinations was agreed upon, the administration team notified the survey logistic team regarding the school locations, scheduled examination sessions and the list of children from whom parental consent had been received.

5.1.3. Survey logistic team and dental helper

Staff involved: Jafar, Aimi and Syahnurul

Preparation of all the equipment, instruments and materials for each school was essential before any dental examination was performed.

The survey logistic team was responsible for ensuring that all necessary equipment/materials were available at each school site and setting up the examination area with enough supplies of instruments and materials for the session.

Equipment, dental instruments and materials required

Paperwork supplies

- Oral health survey protocol
- Data summary
- Lists of school children whose consent forms have been received
- Examination day sheet
- Data collection sheet
- Stationery items (pens, pencils, others)

Dental examination equipment

- Portable dental chairs with a portable 3-in-1 syringe body
- Portable inspection light with Halogen bulb
- Instrument containers for clean and dirty instruments
- Protective safety glasses (to protect children's eyes)
- Autoclaved dental mirrors and trays
- Autoclaved ball-ended CPITN probes or ball-ended probes (0.5mm)
- Disposable syringe tips
- Surgical masks
- Safety goggles
- Gloves (latex and non-latex types)
- Cotton wool rolls (to remove debris and for moisture control)
- Clinical and domestic waste bags

5.1.4. Examination team

Staff involved: Dr Majidi, Zulhafiy, Jafar, Aimi and Syahnurul

Calibration training for the principal investigator in Ireland

Initially, the principal investigator, the first dental examiner, underwent training and calibration (following the BASCD standards) by Professor Mairead Harding, the Professor of Dental Public Health & Preventive Dentistry at the University of Cork, Ireland. This calibration training was conducted in mid-May 2023.

Calibration training for the dental examiner and dental recorders in Brunei Darussalam

In Brunei Darussalam, the calibration training involved:

- **a calibration lecture**
 - The principal investigator delivered a lecture on dental calibration to the examination team (consisting of the dental examiner & dental recorders)
- **a calibration training on schoolchildren**
 - The principal investigator trained and calibrated the second dental examiner, i.e. a qualified and registered Dental Hygienist and Therapist. The two dental recorders (qualified and registered Dental Nurses) were also trained. They recorded every code the examiners called directly onto portable computers via password-protected Microsoft Excel designed for the study. Paper-based forms were available for data recording if there were issues with the electronic form.
 - This calibration training was conducted on ten randomly selected children from one of the randomly selected schools at least one day before the data collection on an accurate study sample.
 - The main purpose of this calibration training is to assess inter-examiner reliability between the two dental examiners. Cohen (1960) concluded that the Kappa score for the inter-examiner reliability should be at least 80%.

5.1.5. Fieldwork procedures

Examinations took place immediately after examiners were trained and calibrated and were completed by the end of July 2023.

Confirming children's details

The dental helper or dental recorders called the selected schoolchildren with parental consent for dental examination in groups of ten. The dental recorders double-checked the unique child's identity (ID) number and confirmed personal details (including name, date of birth and mother's name)

Recording of non-clinical data

Child ID & Demographic data

The recorder was responsible for the correct examiner code and examination date. Moreover, they must ensure that the unique identification number of each child is entered correctly onto the laptop computers. The child's identification number consisted of a prefix from the school code and a suffix from the child's number from a class list (Figure 1). Other personal details were included in the dataset, including gender and date of birth.

School code			No. of sampled child		
0	1	2	0	0	9

Figure 1. Unique identification number of a child

Examination Status

The following codes (Table 2) were used to record examination status:

Table 2. Codes for recording examination status

Code	Description
0	Child is examined
1	Child is re-examined by the same examiner to assess inter-examiner reliability
2	Child is examined during the training session
3	Child is absent
4	Child refused examination

The dental examination

The dental examinations for 5-year-old children were conducted onsite in participating schools. They followed the following procedure:

- The participant was asked to lie down on a portable reclining dental chair.
- The examiner then sat behind the participant and used a dental mirror and a portable light source to undertake a visual dental inspection without using dental loupes.

- Drying of teeth – using a 3-in-1 syringe
- In turn, the examiner described each tooth using codes recorded by the recorder. These included assessment of plaque, decay status evaluation and presence/ absence of sepsis (see sections that follow)

Standardisation of the dental examiners

Two dental examiners were involved in the dental examination. Inter-examiner reliability between these dental examiners was assessed by examining a sample of 10% of children within the randomly selected schoolchildren (i.e., 36 children). This inter-examiner reliability assessment was conducted in two separate schools at two-day intervals (i.e., 18 children from each school). According to Cohen (1960), the Kappa score for the inter-examiner reliability should be at least 80%. The kappa score achieved during the calibration training was 95%.

Assessment of plaque

- A plaque index based on the Silness and Loe index (Silness and Loe, 1964) was used (Table 3).
- The visual plaque examination involved six teeth: upper canine to upper canine (53, 52, 51, 61, 62, 63 in the primary dentition of 5-year-olds; and 13, 12, 11, 21, 22, 23 in the permanent dentition of 12-year-olds children.)
- Neither probe nor disclosing solution was used for this assessment.
- Any food debris was ignored in the visual examination.

Table 3. *Plaque Codes that were used for Recording*

Code	Description
0	No plaque present
1	Little visible plaque
2	Substantial amount of plaque
9	Assessment cannot be made for upper anterior sextant

Charting rules

Before recording any presence or absence of teeth, the following dental charting rules had to be understood by the examiner:

- When any part of a tooth was visible in the mouth, it was considered to have erupted. Unerupted surfaces were considered sound
- Any supernumerary teeth were not recorded. If a tooth and a supernumerary were identical, the supernumerary was considered the distal of the two.
- Primary incisors that were missing were assumed to be exfoliated and assigned tooth code 8
- Non-carious abnormalities, such as hypoplasia, were prioritised over caries
- Retained roots after extraction or gross breakdown were regarded as code 3
- Any discoloured, non-vital incisors that were free of caries or fractures were recorded as code T for trauma on all surfaces
- Any obscured surfaces, such as banded teeth, were assumed to be sound and coded with ‘_’

Teeth present

The examiners recorded the teeth' presence with a mirror, starting from the furthest tooth position on the upper right quadrant (tooth 55), going to the most distant tooth position on the upper left quadrant (tooth 65), then to tooth 75 and finally proceeding to tooth 85 (Figure 2).

Data was recorded by tooth surface. A line running across the point of maximal curvature demarcates the border between the mesial/distal surface and the neighbouring lingual/buccal surface.

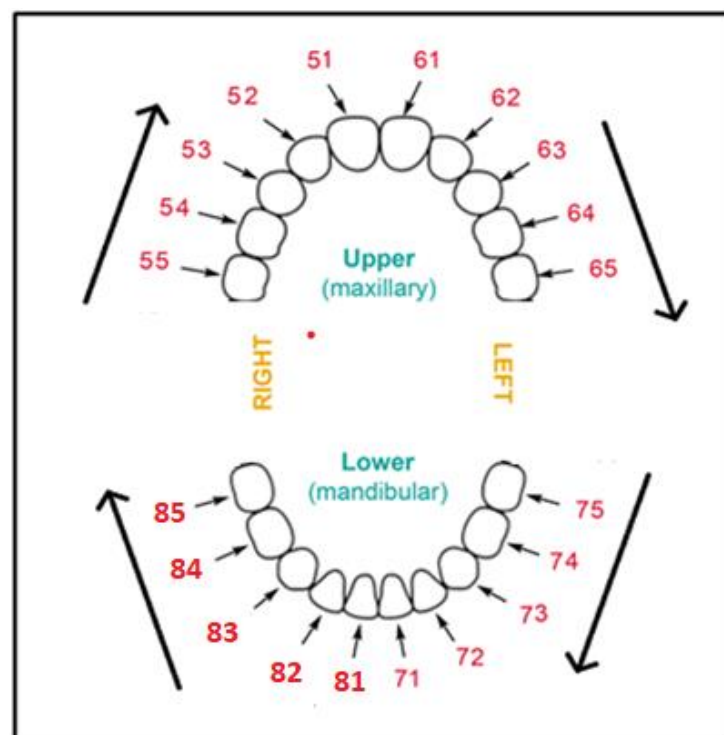


Figure 2. Methods of recording the sequence of the teeth

Absent teeth and obscured surfaces

Table 4. Codes for recording absent teeth and obscured

Tooth Code	Description	Criteria
6	Extracted due to caries	Surfaces were considered missing if the tooth they were a part of had been removed because it was carious. Surfaces that were absent for any other reason did not fall into this category. Any missing primary canines and primary molars were regarded to have been extracted (code 6) unless there was unquestionable evidence that a tooth had been extracted or lost for other causes
8	Unerupted and missing other	Primary missing incisors were not counted and were classified as code 8 – unerupted or missing.
-	Obscured surfaces	All obscured surfaces were considered as sound (surface code '-') unless there was an indication of disease experience on the remaining visible part of the tooth, in which case the tooth was then coded according to its categorisation for those visible surfaces

Caries diagnostic codes

The condition of tooth surfaces was diagnosed visually and diagnostic criteria and codes were strictly adhered to (Table 5). Unless the criteria are fulfilled, caries were not recorded as present.

Table 5. Diagnostic codes for caries

Code	Description	Criteria
1	Arrested dentinal decay	surfaces with arrested caries into dentine are regarded as arrested dentinal decay only.
2	Caries into dentine	After visual inspection, surfaces are considered decayed if there is a carious lesion in the dentine. On incisors where the lesion starts mesially or distally, buccal/lingual surfaces would usually be involved.
3	Caries with pulpal involvement	A surface is assigned code 3 where a carious lesion involves the pulp, irrespective of whether it has been restored. Retained roots following extraction or gross breakdown are assigned code 3.
4	filled and decayed	a surface presented with a restoration and a carious lesion fulfilling the criteria for code 2 (whether or not the lesion(s) are in physical association with the filling (s) was considered as code 4 unless the caries lesion is so extensive as to be categorised as 'decay with pulpal involvement', in that situation the restoration would be ignored. The surface is regarded as code 3.
5	filled with no decay	Surfaces that have a satisfactory permanent filling of any material were considered in this category (Note: obvious sealant restorations were coded separately as code N).

R	filled, needs replacement (not carious)	If the restoration is chipped or cracked and has to be replaced, but there is no indication of caries into the dentine on the same surface, it is considered to be in this category. A temporary dressing with a caries lesion and cavities or cavities where a restoration has been lost was considered 'filled, needs replacement' unless the caries progressed into dentine, which was considered 'decayed'. Note: the number of teeth/surfaces with code R should be separately identified. However, if categories are to be combined later, code R surfaces should be included in the 'filled' component because no new caries are visible.
C	Permanent crown	Any surface with a permanent crown was considered to be in this category. This is true regardless of the materials used or the reasons leading to the crown's placement. Pre-formed and stainless-steel crowns are also deemed code C.
T	Traumatized	A surface was classified as traumatized if the examiner believes it has been subjected to trauma and as a result, is fractured so as to expose dentine, discoloured, or has a temporary or permanent filling (excludes crown). Minor trauma to the enamel was ignored. Where a tooth is missing through trauma, all surfaces should be coded T.
\$	sealed surface, type unknown	all occlusal, buccal and lingual surfaces with some fissure sealant but no defined cavity margin can be observed (note: Both preventive and therapeutic sealants would ultimately fall into this group.). Even if a clear sealant is in place and a caries lesion appears to be visible through the sealant material, the surface should still be classified \$ – sealed surface, type unknown.
N	obvious sealant restorations	on all occlusal, buccal and lingual surfaces with a tooth-coloured restoration where there is evidence of a defined cavity margin and a sealed unrestored fissure. If there is any uncertainty about whether or not a preventive sealant or a sealant restoration is present, the surface shall be considered preventively sealed. - code \$.

When in doubt about the classification of any condition, the lower category should always be considered, i.e. underscoring rather than overscoring.

Presence of abscess or sepsis

Regardless of the cause, all cases of sepsis must be recorded (Table 6). There should be no attempt to determine the source of the infection.

Table 6. Codes for recording the presence of abscess or sepsis

Code	Description
0	No abscess or sinus is present
1	Presence of any abscess or sepsis

5.2. Dental referral pathways for children in oral health survey

According to the GDPR, parents or guardians have the right to access their and their child's data and receive a copy of it. Therefore, parents or guardians were only given summary results of their child's dental examination.

Each child was given a referral form after the dental examination and referred to the nearest dental clinic for routine check-ups or routine or immediate dental care, depending on the child's oral health status during the dental examination (Figure 3).

Children with dental caries were given a referral form and referred to a Dental Nurse in the nearest dental clinic for further check-ups within 1 to 3 months, depending on the severity of dental caries.

If an abscess or sepsis was found during the dental examination, no attempt should have been made to determine the source of the infection. Children with this dental swelling, as well as with dental pain or injury, were given a referral form. The parents were informed immediately and the children were referred to a dentist or Dental Nurse immediately in the nearest dental clinic for emergency dental care.

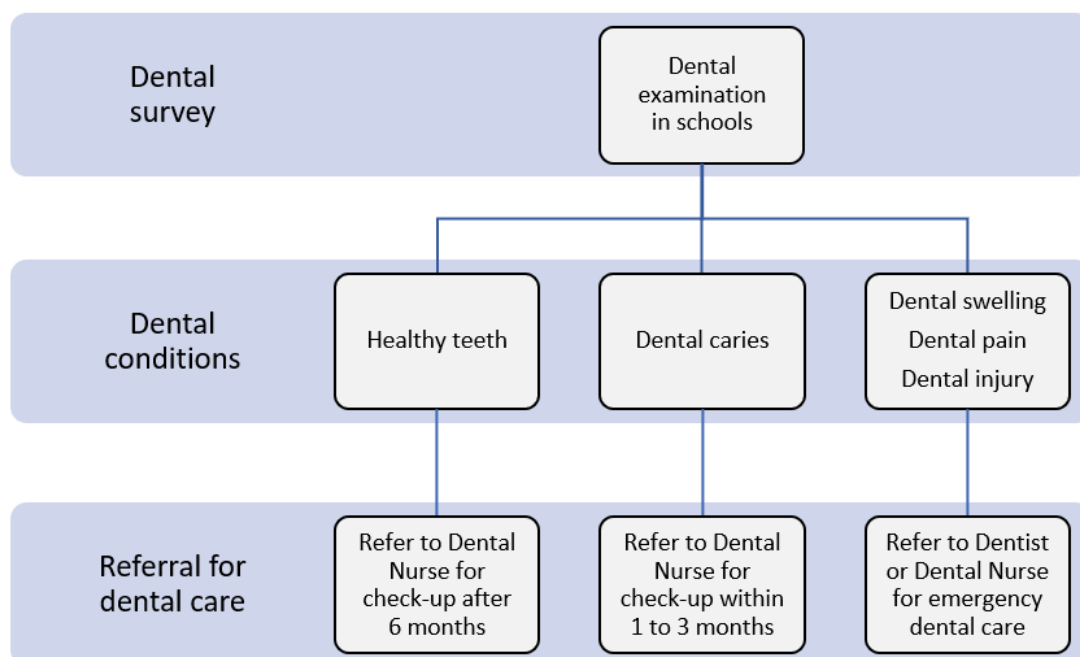


Figure 3. Dental referral pathway of children for further dental care

5.3. Data storage and confidentiality

An electronic version of the participants' dataset and consent form was kept on password-protected Microsoft 365, secured and supported by TCD IT services. Only the principal investigator, Dr Rizan (Clinical supervisor) and Dr Bahman (Statistician) had access to this information. To protect information, password protection, encryption and antivirus software were used on every file containing personal data.

Paper-based consent forms were scanned and kept as electronic versions. Then, these electronic versions were handled as above. The PI shredded and disposed of paper copies of the consent forms immediately in accordance with Trinity College Dublin's procedures.

All the electronic quantitative data will be retained in password-protected Microsoft 365 for seven years following the completion of this study. Dr Brett Duane (Supervisor) will monitor it after Dr Majidi Bakar finishes his D.Ch.Dent. Programme. After seven years have passed, Brett Duane (supervisor) will delete and destroy all the electronic data in accordance with standard University procedures.

6. Reference

Robert-Thomson, K., Peres, K., Ellershaw, A., Koster, C., Gabriela, D., Aldis, J., Thomas, R., Phung, T. & White, A. (2017). Brunei Darussalam Oral Health Survey 2014-17: Final report. Australian Research Centre for Population Oral Health, The University of Adelaide.

Silness, J. and Loe, H. (1964). Periodontal disease in pregnancy. II Correlation between oral hygiene and periodontal condition. *Acta Odontologica Scandinavica* 22: 121–135.

7.Additional materials

a. Delegation log for staff involved in the study

Delegation log

Name of study: Associations between early-life behaviours, contemporary oral health behaviours and oral health amongst children in Brunei Darussalam and their implications for oral health prevention strategies.

REC reference: 221104

Name of Principal Investigator: Dr. Majidi Bakar

Start date of study (Date of ethics approval): June 2023 **End date of study:** June 2024

This is a delegation log and controls to record who are involved in each task, including accesses, changes, discloses or erases all personal data collected, for the study.

For each person listed in the Name column, record the tasks delegated to that person. Tasks should only be delegated to people who are suitably qualified by education, training and/or experience to carry out that task/role.

NAME	SIGNATURE	STUDY TASK	START OF TASK	PI SIGNATURE	END OF TASK	PI SIGNATURE
	My signature below indicates: - I accept to carry out the delegated task(s) - I acknowledge the Data Privacy Statement attached to this document					
Dr. Majidi Bakar		Prepare study proposal, ethics submission form & DPIA form				
Dr. Clare Jones Dr. Brett Duane Dr. Maria van Harten Dr. Haji Amirul Rizan		Check finalised version of study protocol, ethics submission form & DPIA form				-
Dr. Majidi Bakar		Submit above-mentioned documents and receive approvals				
Dr. Majidi Bakar		Pilot PILs, consent forms & questionnaires (10 participants)				
Dr. Majidi Bakar		Pilot semi-structured interview sessions (3 participants)				

Dr. Majidi Bakar		Conduct sampling of schools and children				
Dr. Majidi Bakar Siti Malinah Samat		Contact selected schools for class lists				
Dr. Majidi Bakar Siti Malinah Samat		Distribute PILs, consent forms & questionnaires. Then collect personal and sensitive data from these documents				
Dr. Majidi Bakar Jaafar Jamil Aimi Lutfi Syahnurul Abdur'rahmani Zulhafiy Yusran		Conduct dental examination activities - confirm original personal data (names and DOB) with child participants - collect original sensitive data from the dental examination activities				
Dr. Majidi Bakar Dr. Melvin Lim Ya Wei		Conduct semi-structured interviews - confirm original personal data (names) with participants - collect original sensitive data from the sessions				
Dr. Majidi Bakar Siti Malinah Samat		Transfer data to database				
Dr. Majidi Bakar Dr. Haji Amirul Rizan Dr. Maria van Harten		Data checking for accuracy				
Dr. Majidi Bakar Dr. Haji Amirul Rizan Dr. Maria van Harten		Clean data				
Dr. Majidi Bakar Dr. Haji Amirul Rizan Dr. Maria van Harten		Analyse data				
Dr. Majidi Bakar Dr. Haji Amirul Rizan		Report data				

Dr. Maria van Harten						
Dr. Majidi Bakar Dr. Clare Jones Dr. Brett Duane Dr. Haji Amirul Rizan Dr. Maria van Harten		Write-up report				

I confirm that the information in this form is accurate and complete.

Name of Principal Investigator

Signature

Date

b. Data summary of oral health survey

Data summary of oral health survey for 5-year-olds

[illegible]

c. Examination day sheet

Examination day sheet form

Name of school: _____

Date of examination: _____

Name of school contact: _____ Telephone number: _____

[illegible]

d. Data collection sheet for each child participant

Data collection sheet for oral health survey

1. Examiner _____ 2. School name _____

3. Type of school |__| (0 - Government 1- Private school) 4. Examination date
|_d_|_|_d_|_|_m_|_|_m_|_|_y_|_|_y_|_|_y_|_|_y_|_|

5. School Code 6. Number of sampled child

7. Child identity number

8. Date of birth |_d_|_|m_|_|y_|_|y_|_|y_|_|y|_ 9. Home postcode |_|_| |_|_|_|_|_|_|

10. Sex ☐ 0 - Male 1 - Female 2 - Other 11. Twin birth ☐ 0 - No 1 - Yes

12 Ethnicity |__| (1 - Brunei Malay 2- Other Brunei Malay 3 -Other indigenous 4 - Chinese
 5 - Other)

13. Sample group code 0 - Main sample 1 - Additional sample A 2 - Additional sample B
3 - Additional sample C 4 - Additional sample D

14. Examination status |__| 0 - Examined 1 - Repeat exam 2 - Training
3 - Absent 4 - Child refused

15. Plaque ☐ 0 - Teeth appear clean 1 - $\leq \frac{1}{3}$ labial surfaces 2 - $> \frac{1}{3}$ and $\leq \frac{2}{3}$ labial surfaces
3 - $> \frac{2}{3}$ labial surfaces 9 - No assessment could be made

Tooth Codes	
Extracted due to caries	6
Unerrupted or missing other	8
Surface Codes	
Sound	-
Arrested caries into dentine	1
Caries into dentine	2
Caries and pulpal involvement	3
Roots only remaining	3
Filled and carious	4
Filled with no caries	5
Unrecordable	9
Filled, needs replacement	R
Crown	C
Trauma	T
Sealed surface	\$
Obvious sealant restoration	N
Partial examinations in special schools only	
Unseen tooth because cooperation withdrawn	#

Right		UPPER								Left	
	E	D	C	B	A	A	B	C	D	E	
D											D
O											O
M											M
B											B
L											L

Right		LOWER								Left	
	E	D	C	B	A	A	B	C	D	E	
D											D
O											O
M											M
B											B
L											L

16. Enamel caries |__| 0 - No 1 - Yes

17. Pufa |__| 0 - No pufa signs 1 - 1 pufa sign 2 - ≥2 pufa signs

18. Spare variable (if required locally)

e. Referral form for children in Oral Health Survey

Referral form for children in Oral Health Survey

Date	:
Child's name	:
Child's age	:
Your child has	☐ Plaque ☐ Dental decay ☐ Dental swelling ☐ Dental pain ☐ Dental injury
Reason for referral	☐ Check-up (see a Dental Nurse in the nearest dental clinic after 6 months) ☐ Dental decay (see a Dental Nurse in the nearest dental clinic within 1 month) ☐ Dental swelling (see a Dentist in the nearest dental clinic immediately) ☐ Dental pain (see a Dental Nurse in the nearest dental clinic immediately) ☐ Dental injury (see a Dentist in the nearest dental clinic immediately)
Referred by	:

Note for parent or guardian:

- Brush your child's teeth until they reach 7 years old
- Brush your child's teeth twice daily using adult fluoridated toothpaste
- Encourage your child to eat healthy food and drink water
- Avoid your child from snacking in between meals
- Avoid your child from bottle-feeding

Appendix 23. ZINB regression model to assess the associations of each early-life health behaviour with the severity of caries experience in young children and then adjusting for sex, ethnicity, school type, parental education and household income sequentially

IRR/ OR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Age of start brushing (n = 310)						
Negative binomial portion (Count model)						
6 months and below (ref)						
6 to 12 months	1.21 (0.73, 1.98) p=0.461	1.41 (0.84, 2.36) p=0.193	1.29 (0.24, 7.09) p=0.385	1.29 (0.20, 8.13) p=0.347	1.15 (0.70, 1.89) p=0.582	1.19 (0.73, 1.95) p=0.487
12 to 24 months	1.32 (0.76, 2.29) p=0.321	1.62 (0.92, 2.85) p=0.096	1.32 (0.11, 15.26) p=0.212	1.32 (0.09, 19.78) p=0.167	1.25 (0.72, 2.16) p=0.427	1.33 (0.78, 2.30) p=0.298
24 months and above	1.22 (0.73, 2.05) p=0.453	1.43 (0.84, 2.45) p=0.188	1.31 (0.40, 4.27) p=0.547	1.31 (0.32, 5.37) p=0.472	1.15 (0.68, 1.96) p=0.606	1.20 (0.71, 2.03) p=0.503
Zero-inflated portion (Caries-free model)						
6 months and below (ref)						
6 to 12 months	0.38 (0.17, 0.85) p=0.018	0.36 (0.15, 0.85) p=0.020	1.54 (0.01, 172.38) p=0.016	1.56 (0.01, 197.73) p=0.014	0.33 (0.14, 0.79) p=0.012	0.33 (0.14, 0.78) p=0.012
12 to 24 months	0.28 (0.10, 0.79) p=0.016	0.27 (0.10, 0.77) p=0.014	1.67 (0.01, 228.88) p=0.012	1.68 (0.01, 190.14) p=0.016	0.24 (0.08, 0.70) p=0.009	0.25 (0.09, 0.72) p=0.011
24 months and above	0.33 (0.14, 0.81) p=0.015	0.31 (0.12, 0.77) p=0.012	1.59 (0.02, 143.84) p=0.021	1.61 (0.02, 145.03) p=0.022	0.36 (0.14, 0.90) p=0.028	0.36 (0.14, 0.92) p=0.032
Frequency of brushing per day at ages 2-3 (n = 307)						
Negative binomial portion (Count model)						
Less than twice (ref)						
Twice and more	0.79 (0.56, 1.12), p=0.184	0.73 (0.52, 1.02), p=0.070	0.66 (0.47, 0.92), p=0.014	0.62 (0.44, 0.85), p=0.004	0.71 (0.50, 1.00), p=0.050	0.67 (0.48, 0.94), p=0.022
Zero-inflated portion (Caries-free model)						
Less than twice (ref)						
Twice and more	1.18 (0.58, 2.41), p=0.645	1.24 (0.60, 2.53), p=0.561	1.39 (0.69, 2.81), p=0.361	1.39 (0.68, 2.84), p=0.361	1.40 (0.66, 2.95), p=0.377	1.40 (0.67, 2.93), p=0.376
Toothbrushing supervision at ages 2-3 (n = 303)						
Negative binomial portion (Count model)						
No supervision (ref)						
Parental supervision	0.87 (0.61, 1.26), p=0.464	0.78 (0.54, 1.13), p=0.191	0.84 (0.59, 1.19), p=0.323	0.85 (0.60, 1.21), p=0.365	0.82 (0.57, 1.18), p=0.288	0.83 (0.58, 1.19), p=0.309
Zero-inflated portion (Caries-free model)						
Children (ref)						
Parental supervision	4.52 (1.03, 19.80), p=0.045	4.77 (1.21, 18.87), p=0.026	4.53 (1.23, 16.72), p=0.023	4.53 (1.16, 17.59), p=0.029	5.92 (1.22, 28.64), p=0.027	5.32 (1.23, 23.04), p=0.025

Age of stopping breastfeeding (n = 298)						
Negative binomial portion (Count model)						
24 months or more (ref)						
Between 12 and 24 months	0.93 (0.59, 1.46), p=0.751	1.11 (0.70, 1.77), p=0.656	1.08 (0.69, 1.70), p=0.736	1.09 (0.70, 1.71), p=0.705	1.07 (0.68, 1.69), p=0.769	1.12 (0.71, 1.76), p=0.638
12 months and below	1.08 (0.79, 1.49), p=0.620	1.03 (0.75, 1.41), p=0.875	1.08 (0.79, 1.47), p=0.649	1.08 (0.79, 1.47), p=0.626	1.00 (0.73, 1.38), p=0.993	1.01 (0.74, 1.38), p=0.954
Zero-inflated portion (Caries-free model)						
24 months or more (ref)						
Between 12 and 24 months	1.70 (0.78, 3.70), p=0.179	2.00 (0.90, 4.46), p=0.089	1.93 (0.85, 4.35), p=0.114	2.21 (0.96, 5.07), p=0.062	2.43 (1.03, 5.75), p=0.044	2.63 (1.09, 6.34), p=0.031
12 months and below	0.78 (0.39, 1.56), p=0.486	0.80 (0.38, 1.67), p=0.549	0.80 (0.38, 1.69), p=0.566	0.81 (0.38, 1.72), p=0.587	0.90 (0.41, 1.98), p=0.788	0.90 (0.42, 1.94), p=0.792
Age of first dental visit (n = 312)						
Negative binomial portion (Count model)						
Below 12 months (ref)						
12 months and above	0.97 (0.71, 1.33), p=0.838	1.03 (0.75, 1.42), p=0.843	1.01 (0.74, 1.37), p=0.954	1.01 (0.75, 1.36), p=0.957	0.97 (0.72, 1.31), p=0.843	0.97 (0.72, 1.30), p=0.832
Never visit	0.52 (0.34, 0.78), p=0.002	0.59 (0.39, 0.90), p=0.013	0.55 (0.36, 0.82), p=0.004	0.56 (0.37, 0.85), p=0.006	0.52 (0.33, 0.81), p=0.004	0.53 (0.34, 0.83), p=0.005
Zero-inflated portion (Caries-free model)						
Below 12 months (ref)						
12 months and above	1.69 (0.83, 3.47), p=0.151	1.78 (0.84, 3.80), p=0.135	1.64 (0.78, 3.46), p=0.191	1.45 (0.69, 3.01), p=0.324	1.36 (0.65, 2.84), p=0.412	1.33 (0.64, 2.75), p=0.445
Never visit	1.61 (0.65, 3.97), p=0.305	1.68 (0.65, 4.34), p=0.285	1.66 (0.64, 4.28), p=0.294	1.63 (0.63, 4.20), p=0.315	1.39 (0.50, 3.83), p=0.529	1.45 (0.53, 3.97), p=0.465

Model 1: unadjusted; Model 2: adjusted for sex and ethnicity; Model 3: adjusted for sex, ethnicity and school type; Model 4a: adjusted for sex, ethnicity, school type and parental education;

Model 4b: adjusted for sex, ethnicity, school type and household income; Model 5: Fully adjusted

Appendix 24. ZINB regression model to assess the associations of all early-life health behaviours at once with the severity of caries experience in young children and then adjusting for sex, ethnicity, school type, parental education and household income sequentially

IRR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Negative binomial portion (Count model)						
Age of start brushing						
6 months and below (ref)						
6 to 12 months	1.14 (0.67, 1.94), p=0.618	1.23 (0.72, 2.09), p=0.445	1.09 (0.66, 1.79), p=0.749	1.10 (0.67, 1.80), p=0.704	1.04 (0.63, 1.74), p=0.867	1.07 (0.65, 1.76), p=0.789
12 to 24 months	1.36 (0.76, 2.41), p=0.299	1.48 (0.83, 2.65), p=0.188	1.28 (0.74, 2.21), p=0.375	1.33 (0.78, 2.28), p=0.297	1.11 (0.63, 1.95), p=0.714	1.22 (0.71, 2.09), p=0.477
24 months and above	1.38 (0.79, 2.43), p=0.258	1.47 (0.83, 2.60), p=0.182	1.15 (0.67, 1.98), p=0.623	1.15 (0.68, 1.96), p=0.604	1.22 (0.70, 2.14), p=0.486	1.21 (0.71, 2.07), p=0.487
Frequency of brushing per day at age 2-3						
Less than twice (ref)						
Twice and more	0.78 (0.54, 1.14), p=0.201	0.76 (0.53, 1.10), p=0.149	0.70 (0.50, 0.99), p=0.043	0.66 (0.48, 0.93), p=0.017	0.79 (0.54, 1.15), p=0.210	0.74 (0.52, 1.05), p=0.087
Toothbrushing supervision at age 2-3						
No supervision (ref)						
Adult supervision	0.73 (0.49, 1.09), p=0.125	0.67 (0.45, 1.00), p=0.049	0.73 (0.50, 1.06), p=0.097	0.77 (0.53, 1.11), p=0.162	0.71 (0.48, 1.05), p=0.089	0.74 (0.51, 1.08), p=0.119
Age of stopping breastfeeding						
24 months or more (ref)						
Between 12 and 24 months	0.93 (0.59, 1.46), p=0.745	1.01 (0.64, 1.58), p=0.979	0.99 (0.65, 1.51), p=0.963	1.01 (0.67, 1.52), p=0.967	1.05 (0.66, 1.65), p=0.846	1.07 (0.69, 1.64), p=0.767
12 months and below	1.06 (0.75, 1.50), p=0.756	1.04 (0.74, 1.44), p=0.837	1.09 (0.80, 1.49), p=0.594	1.11 (0.82, 1.50), p=0.516	1.06 (0.76, 1.48), p=0.741	1.07 (0.79, 1.47), p=0.655
Age of first dental visit						
Below 12 months (ref)						
12 months and above	0.97 (0.68, 1.38), p=0.852	1.02 (0.73, 1.44), p=0.892	1.02 (0.74, 1.40), p=0.897	1.00 (0.73, 1.36), p=0.988	1.04 (0.74, 1.45), p=0.829	1.00 (0.72, 1.37), p=0.989
Never visit	0.49 (0.31, 0.77), p=0.002	0.56 (0.36, 0.86), p=0.009	0.55 (0.37, 0.84), p=0.005	0.56 (0.37, 0.85), p=0.006	0.51 (0.32, 0.82), p=0.005	0.52 (0.33, 0.82), p=0.005

OR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Zero-inflated portion (Caries-free model)						
Age of start brushing						
6 months and below (ref)						
6 to 12 months	0.33 (0.13, 0.83), p=0.018	0.32 (0.13, 0.83), p=0.018	0.32 (0.13, 0.80), p=0.015	0.31 (0.12, 0.78), p=0.013	0.29 (0.11, 0.78), p=0.013	0.31 (0.12, 0.79), p=0.014
12 to 24 months	0.26 (0.09, 0.77), p=0.015	0.25 (0.08, 0.77), p=0.015	0.27 (0.09, 0.77), p=0.014	0.26 (0.09, 0.75), p=0.013	0.21 (0.06, 0.74), p=0.015	0.23 (0.07, 0.71), p=0.011
24 months and above	0.33 (0.13, 0.87), p=0.024	0.32 (0.12, 0.85), p=0.022	0.36 (0.14, 0.92), p=0.034	0.34 (0.13, 0.91), p=0.031	0.39 (0.14, 1.06), p=0.065	0.39 (0.14, 1.08), p=0.069
Frequency of brushing per day at age 2-3						
Less than twice (ref)						
Twice and more	1.32 (0.55, 3.13), p=0.533	1.32 (0.56, 3.13), p=0.527	1.45 (0.64, 3.29), p=0.377	1.52 (0.22, 10.39), p=0.326	1.61 (0.58, 4.42), p=0.360	1.52 (0.64, 3.62), p=0.341
Toothbrushing supervision teeth at age 2-3						
No supervision (ref)						
Adult supervision	4.21 (0.81, 21.96), p=0.088	3.13 (0.85, 11.54), p=0.087	3.11 (0.87, 11.05), p=0.080	1.98 (0.08, 48.27), p=0.103	5.06 (0.61, 41.86), p=0.133	3.98 (0.83, 19.21), p=0.085
Age of stopping breastfeeding						
24 months or more (ref)						
Between 12 and 24 months	2.05 (0.88, 4.74), p=0.095	2.14 (0.94, 4.88), p=0.072	2.00 (0.89, 4.50), p=0.096	1.54 (0.04, 62.62), p=0.059	2.42 (0.97, 6.05), p=0.059	2.50 (1.03, 6.10), p=0.044
12 months and below	0.87 (0.39, 1.92), p=0.730	0.94 (0.44, 2.01), p=0.868	0.96 (0.46, 2.03), p=0.925	1.46 (2.59, 0.82), p=0.770	0.94 (0.40, 2.17), p=0.877	0.94 (0.43, 2.03), p=0.873
Age of first dental visit						
Below 12 months (ref)						
12 months and above	2.21 (1.00, 4.86), p=0.050	2.32 (1.01, 5.32), p=0.047	2.06 (0.93, 4.55), p=0.074	1.51 (0.06, 38.42), p=0.098	1.68 (0.72, 3.94), p=0.230	1.71 (0.76, 3.82), p=0.191
Never visit	1.88 (0.66, 5.32), p=0.237	2.09 (0.73, 5.96), p=0.168	1.99 (0.73, 5.45), p=0.179	1.68 (0.08, 33.39), p=0.127	1.66 (0.52, 5.27), p=0.387	1.77 (0.59, 5.33), p=0.308

Model 1: unadjusted; Model 2: adjusted for sex and ethnicity; Model 3: adjusted for sex, ethnicity and school type; Model 4a: adjusted for sex, ethnicity, school type and parental education;

Model 4b: adjusted for sex, ethnicity, school type and household income; Model 5: Fully adjusted

Appendix 25. ZINB regression model to assess the associations of each current oral health behaviour with the severity of caries experience in young children and then adjusting for sex, ethnicity, school type, parental education and household income sequentially

IRR/ OR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Frequency of brushing per day at present (n = 308)						
Negative binomial portion (Count model)						
Less than twice (ref)						
Twice and more	0.88 (0.59, 1.32), p=0.542	0.83 (0.56, 1.24), p=0.369	0.85 (0.58, 1.24), p=0.396	0.79 (0.54, 1.16), p=0.235	1.05 (0.72, 1.51), p=0.812	0.96 (0.66, 1.41), p=0.850
Zero-inflated portion (Caries-free model)						
Less than twice (ref)						
Twice and more	6.88 (0.66, 71.14), p=0.106	7.30 (0.96, 55.84), p=0.055	6.23 (1.09, 35.71), p=0.040	5.45 (1.12, 26.59), p=0.036	4.62E+06 (0.00, N/A), p=0.981	2.12E+07 (0.00, N/A), p=0.993
Toothbrushing supervision at present (n = 308)						
Negative binomial portion (Count model)						
No supervision (ref)						
Parental supervision	0.91 (0.69, 1.22), p=0.539	0.85 (0.63, 1.14), p=0.328	0.87 (0.66, 1.15), p=0.328	0.88 (0.66, 1.16), p=0.366	0.86 (0.66, 1.14), p=0.293	0.87 (0.66, 1.14), p=0.313
Zero-inflated portion (Caries-free model)						
No supervision (ref)						
Parental supervision	1.43 (0.78, 2.60), p=0.208	1.47 (0.80, 2.70), p=0.247	1.43 (0.78, 2.60), p=0.247	1.42 (0.77, 2.63), p=0.257	1.53 (0.83, 2.83), p=0.174	1.46 (0.79, 2.71), p=0.231
Types of toothpaste used						
Negative binomial portion (Count model)						
Adult fluoridated (ref)						
Child fluoridated	0.80 (0.32, 2.01), p=0.637	1.82 (0.58, 5.72), p=0.307	2.02 (0.68, 5.96), p=0.204	1.74 (0.59, 5.14), p=0.314	2.03 (0.72, 5.67), p=0.178	2.07 (0.74, 5.80), p=0.167
Non-fluoridated	0.39 (0.17, 0.92), p=0.032	0.51 (0.21, 1.27), p=0.150	0.59 (0.25, 1.42), p=0.241	0.66 (0.27, 1.59), p=0.355	0.66 (0.27, 1.59), p=0.387	0.72 (0.28, 1.87), p=0.502
Zero-inflated portion (Caries-free model)						
Adult fluoridated (ref)						
Child fluoridated	0.70 (0.08, 6.13), p=0.749	1.01 (0.17, 6.10), p=0.990	0.88 (0.15, 5.10), p=0.889	0.88 (0.13, 5.70), p=0.889	0.59 (0.08, 4.29), p=0.604	0.57 (0.07, 4.30), p=0.582
Non-fluoridated	0.00 (0.00, N/A), p=0.968	0.00 (0.00, N/A), p=0.979	0.00 (0.00, N/A), p=0.983	0.00 (0.00, N/A), p=0.997	0.09 (0.00, 269.92), p=0.559	0.09 (0.00, 229.10), p=0.548

Frequency of sugary food intake per day (n = 314)						
Negative binomial portion (Count model)						
Once or less (ref)						
Two or three times	1.01 (0.69, 1.47), p=0.973	0.96 (0.65, 1.41), p=0.839	0.93 (0.64, 1.35), p=0.690	0.90 (0.62, 1.29), p=0.555	0.95 (0.65, 1.40), p=0.801	0.92 (0.63, 1.34), p=0.676
Four times or more	1.06 (0.75, 1.48), p=0.747	1.10 (0.78, 1.53), p=0.589	1.11 (0.80, 1.54), p=0.527	1.05 (0.76, 1.46), p=0.750	1.06 (0.76, 1.47), p=0.742	0.99 (0.71, 1.38), p=0.950
Zero-inflated portion (Caries-free model)						
Once or less (ref)						
Two or three times	1.23 (0.60, 2.51), p=0.573	1.30 (0.62, 2.72), p=0.489	1.28 (0.61, 2.71), p=0.516	1.28 (0.61, 2.66), p=0.515	1.33 (0.62, 2.86), p=0.461	1.33 (0.63, 2.80), p=0.450
Four times or more	0.72 (0.36, 1.46), p=0.367	0.78 (0.38, 1.60), p=0.504	0.75 (0.37, 1.52), p=0.420	0.67 (0.33, 1.37), p=0.277	0.67 (0.32, 1.40), p=0.287	0.61 (0.29, 1.29), p=0.196
Frequency of sugary drink intake per day (n = 316)						
Negative binomial portion (Count model)						
Once or less (ref)						
Two or three times	1.27 (0.91, 1.78), p=0.163	1.30 (0.94, 1.82), p=0.116	1.19 (0.86, 1.66), p=0.300	1.08 (0.77, 1.51), p=0.659	1.14 (0.80, 1.60), p=0.469	1.08 (0.76, 1.52), p=0.669
Four times or more	1.30 (0.86, 1.98), p=0.213	1.35 (0.89, 2.03), p=0.156	1.27 (0.85, 1.89), p=0.245	1.15 (0.77, 1.74), p=0.496	1.25 (0.83, 1.87), p=0.286	1.15 (0.76, 1.73), p=0.503
Zero-inflated portion (Caries-free model)						
Once or less (ref)						
Two or three times	0.60 (0.28, 1.28), p=0.187	0.61 (0.29, 1.27), p=0.184	0.67 (0.32, 1.40), p=0.283	0.61 (0.27, 1.38), p=0.238	0.61 (0.28, 1.37), p=0.232	0.57 (0.24, 1.34), p=0.199
Four times or more	0.27 (0.06, 1.18), p=0.082	0.30 (0.08, 1.14), p=0.076	0.32 (0.09, 1.22), p=0.095	0.37 (0.09, 1.49), p=0.162	0.34 (0.09, 1.27), p=0.110	0.34 (0.08, 1.39), p=0.134
Dental attendance in the last two years (n = 304)						
Negative binomial portion (Count model)						
Had visited (ref)						
No visit	0.86 (0.65, 1.14), p=0.285	0.85 (0.64, 1.12), p=0.248	0.83 (0.63, 1.08), p=0.167	0.78 (0.60, 1.03), p=0.079	0.82 (0.63, 1.08), p=0.155	0.80 (0.61, 1.05), p=0.114
Zero-inflated portion (Caries-free model)						
Had visited (ref)						
No visit	0.97 (0.55, 1.72), p=0.919	0.98 (0.55, 1.73), p=0.934	0.04 (-0.53, 0.61), p=0.891	1.04 (0.59, 1.84), p=0.686	1.13 (0.63, 2.03), p=0.639	1.16 (0.64, 2.12), p=0.625

Model 1: unadjusted; Model 2: adjusted for sex and ethnicity; Model 3: adjusted for sex, ethnicity and school type; Model 4a: adjusted for sex, ethnicity, school type and parental education;

Model 4b: adjusted for sex, ethnicity, school type and household income; Model 5: Fully adjusted

Appendix 26. ZINB regression model to assess the associations of all current oral health behaviours at once with the severity of caries experience in young children and then adjusting for sex, ethnicity, school type, parental education and household income sequentially

IRR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Negative binomial portion (Count model)						
Frequency of brushing per day at present						
Less than twice (ref)						
Twice and more	0.86 (0.56, 1.33), p=0.502	0.75 (0.48, 1.17), p= 0.205	0.77 (0.50, 1.17), p=0.224	0.73 (0.48, 1.11), p=0.140	0.99 (0.65, 1.49), p=0.954	0.87 (0.56, 1.34), p=0.521
Toothbrushing supervision at present						
No supervision (ref)						
Adult supervision	0.88 (0.65, 1.19), p=0.400	0.87 (0.64, 1.17), p= 0.360	0.87 (0.66, 1.16), p=0.353	0.89 (0.67, 1.19), p=0.421	0.87 (0.65, 1.17), p=0.360	0.86 (0.63, 1.19), p=0.369
Types of toothpaste used						
Adult fluoridated (ref)						
Child fluoridated	0.71 (0.28, 1.79), p=0.462	1.32 (0.43, 4.09), p= 0.626	1.46 (0.51, 4.21), p=0.485	1.31 (0.46, 3.73), p=0.617	1.71 (0.59, 4.97), p=0.328	2.03 (0.67, 6.13), p=0.211
Non-fluoridated	0.42 (0.16, 1.08), p=0.071	0.48 (0.16, 1.45), p= 0.191	0.58 (0.20, 1.65), p=0.305	0.67 (0.24, 1.85), p=0.435	0.75 (0.27, 2.09), p=0.588	0.85 (0.30, 2.42), p=0.760
Frequency of sugary food intake per day						
Once or less (ref)						
Two or three times	0.92 (0.62, 1.36), p=0.668	0.90 (0.61, 1.33), p= 0.593	0.90 (0.62, 1.30), p=0.562	0.87 (0.60, 1.26), p=0.477	1.03 (0.68, 1.57), p=0.882	1.02 (0.66, 1.58), p=0.924
Four times or more	0.89 (0.61, 1.30), p=0.551	0.93 (0.65, 1.35), p= 0.711	0.98 (0.69, 1.38), p=0.888	0.96 (0.68, 1.36), p=0.829	0.91 (0.63, 1.32), p=0.615	0.88 (0.60, 1.30), p=0.533
Frequency of sugary drink intake per day						
Once or less (ref)						
Two or three times	1.32 (0.92, 1.90), p= 0.136	1.34 (0.94, 1.92), p= 0.105	1.21 (0.85, 1.71), p=0.293	1.11 (0.78, 1.58), p=0.559	1.14 (0.79, 1.66), p=0.478	1.12 (0.76, 1.64), p=0.567
Four times or more	1.35 (0.85, 2.14), p= 0.199	1.33 (0.85, 2.09), p= 0.213	1.20 (0.78, 1.85), p=0.409	1.07 (0.70, 1.65), p=0.745	1.18 (0.75, 1.85), p=0.481	1.06 (0.67, 1.68), p=0.800
Frequency of dental visit per year						
Had visited (ref)						
No visit	0.83 (0.62, 1.11), p= 0.209	0.78 (0.58, 1.05), p= 0.102	0.77 (0.58, 1.03), p=0.074	0.75 (0.57, 1.00), p=0.049	0.80 (0.60, 1.08), p=0.146	0.79 (0.58, 1.07), p=0.131

OR (95% CI), p-value	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5
Zero-inflated portion (Caries-free model)						
Frequency of brushing per day at present						
Less than twice (ref)						
Twice and more	4.76 (0.73, 31.09), p=0.103	5.21 (0.86, 31.63), p=0.073	4.86 (0.95, 24.91), p=0.058	4.70 (0.95, 23.34), p=0.059	8.12E+08 (0.00, N/A), p=0.996	1.47E+09 (0.00, N/A), p=0.996
Toothbrushing supervision at present						
No supervision (ref)						
Adult supervision	1.18 (0.64, 2.17), p=0.591	1.21 (0.65, 2.25), p=0.557	1.13 (0.61, 2.08), p=0.703	1.14 (0.60, 2.14), p=0.694	1.38(0.68, 2.81), p=0.376	1.17 (0.52, 2.64), p=0.704
Types of toothpaste used						
Adult fluoridated (ref)						
Child fluoridated	0.58 (0.05, 7.50), p=0.678	0.75 (0.08, 6.66), p=0.797	0.60 (0.07, 5.05), p=0.642	0.55 (0.06, 5.04), p=0.597	0.99 (0.12, 8.29), p=0.995	1.17 (0.12, 11.46), p=0.894
Non-fluoridated	0.00 (0.00, N/A), p=0.997	0.11 (0.00, 2314.25), p=0.665	0.15 (0.00, 57.66), p=0.535	0.19 (0.00, 17.33), p=0.469	0.43 (0.02, 8.70), p=0.583	0.43 (0.02, 8.95), p=0.588
Frequency of sugary food intake per day						
Once or less(ref)						
Two or three times	1.32 (0.63, 2.75), p=0.463	1.35 (0.64, 2.87), p=0.431	1.33 (0.63, 2.81), p=0.458	1.43 (0.66, 3.08), p=0.363	1.70 (0.67, 4.34), p=0.268	2.11 (0.71, 6.29), p=0.182
Four times or more	0.85 (0.40, 1.84), p=0.685	0.93 (0.43, 2.00), p=0.852	0.84 (0.40, 1.79), p=0.651	0.78 (0.36, 1.70), p=0.531	0.58 (0.23, 1.46), p=0.244	0.49 (0.17, 1.38), p=0.176
Frequency of sugary drink intake per day						
Once or less (ref)						
Two or three times	0.65 (0.29, 1.44), p=0.290	0.65 (0.29, 1.43), p=0.283	0.73 (0.33, 1.61), p=0.434	0.78 (0.34, 1.80), p=0.565	0.54 (0.20, 1.42), p=0.211	0.53 (0.17, 1.70), p=0.285
Four times or more	0.25 (0.05, 1.17), p=0.079	0.28 (0.07, 1.17), p=0.082	0.32 (0.08, 1.33), p=0.117	0.35 (0.07, 1.71), p=0.196	0.26 (0.03, 2.05), p=0.203	0.13 (0.00, 3.87), p=0.238
Dental attendance in the last two years						
Had visited (ref)						
No visit	1.34 (0.72, 2.47), p=0.353	1.28 (0.68, 2.39), p=0.438	1.35 (0.73, 2.50), p=0.345	1.44 (0.77, 2.70), p=0.259	1.54 (0.75,3.16), p=0.242	1.59 (0.69, 3.66), p=0.280

Model 1: unadjusted; Model 2: adjusted for sex and ethnicity; Model 3: adjusted for sex, ethnicity and school type; Model 4a: adjusted for sex, ethnicity, school type and parental education;

Model 4b: adjusted for sex, ethnicity, school type and household income; Model 5: Fully adjusted

Appendix 27. Participant information leaflet for the interview session (Malay version)



Risalah Maklumat Peserta untuk Ibubapa/Penjaga (Bagi sesi temuduga)

Nama kajian: Pengaruh tabiat kesihatan mulut bagi kanak-kanak kepada kesihatan mulut dan kesannya terhadap strategi kesihatan mulut di Negara Brunei Darussalam

Tempat:	Secara talian (atau <i>online</i>) melalui aplikasi <i>Zoom</i> atau <i>Microsoft Teams</i>
Ketua Pengkaji:	Dr. Haji Majidi Haji Awang Bakar Mahasiswa Ijazah Kedoktoran Klinikal bagi Kesihatan Awam Pergigian Trinity College Dublin, University of Dublin, Ireland Emel: Majidi.Bakar@dental.tcd.ie Nombor telefon (Melalui watsapp): +673-8694448
Pengkaji Bersama:	Dr. Clare Jones Penyelia Akademik dalam Kesihatan Awam Pergigian Emel: jonesc8@tcd.ie Dr. Brett Duane Profesor Madya dalam Kesihatan Awam Pergigian Emel: Duane.Brett@dental.tcd.ie Dr. Maria van Harten Tenaga Pengajar dalam Kesihatan Awam Pergigian Emel: Maria.VanHarten@dental.tcd.ie Kesemua Pengkaji Bersama adalah dari Trinity College Dublin, University of Dublin, Ireland
Penyelia Klinikal:	Dr. Haji Amirul Rizan Haji Mohamed Ketua Unit Kesihatan Pergigian Awam, Jabatan Perkhidmatan Pergigian, Negara Brunei Darussalam Emel: rizan.mohamed@moh.gov.bn
Pengajar Kajian:	Dr. Haji Majidi Haji Awang Bakar
Pengawal Data:	Trinity College Dublin, University of Dublin, Ireland & Jabatan Perkhidmatan Pergigian, Negara Brunei Darussalam
Pegawai Perlindungan Data:	<i>Data Protection Officer</i> Trinity College Dublin, University of Dublin, Ireland Emel: dataprotection@tcd.ie

Kami ingin menjemput awda untuk mengambil bahagian dalam kajian yang sedang dijalankan oleh Dr. Haji Majidi (Ketua Pengkaji) sebagai sebahagian daripada pengajiannya di Trinity College Dublin, University of Dublin, Ireland. Sebelum awda membuat keputusan samaada awda akan menyertai kajian ini atau tidak, sila baca **Risalah Maklumat** ini dengan teliti. Sila hubungi Ketua Pengkaji melalui Majidi.Bakar@dental.tcd.ie jika awda mempunyai soalan.

Jangan tergesa-gesa atau berasa tertekan dalam membuat keputusan untuk mengambil bahagian. Awda harus memahami risiko dan faedah kajian ini kepada awda, jika awda membuat keputusan untuk mengambil bahagian. Awda dibolehkan untuk berbincang dengan keluarga, rakan-rakan atau doktor perubatan awda, jika perlu.

Risalah Maklumat ini mempunyai 5 bahagian:

- Bahagian 1 – Kajian
- Bahagian 2 – Perlindungan Data
- Bahagian 3 – Kebenaran, Penganjuran dan Pembiayaan
- Bahagian 4 – Kajian Dimasa Hadapan
- Bahagian 5 – Maklumat Lanjut

Bahagian 1 – Kajian

Kenapa kajian ini dijalankan?

Kajian ini dijalankan untuk mengumpul data terkini tentang kesihatan mulut dikalangan kanak-kanak yang berumur 5 tahun di Negara Brunei Darussalam. Kajian ini juga akan meneliti jika tabiat penjagaan kesihatan mulut kanak-kanak, pada usia awal dan sekarang, ada berkait rapat dengan tahap penyakit/ masalah kesihatan mulut. Matlamat kajian ini adalah untuk mengenalpasti cadangan bagi strategi dan dasar kesihatan mulut pada masa hadapan bagi Jabatan Perkhidmatan Pergigian, Kementerian Kesihatan.

Mengapa saya dijemput untuk mengambil bahagian?

Semasa awda melengkapkan **Borang Soal Selidik** dalam bahagian pertama penyelidikan ini, awda telah menyatakan bahawa awda berminat untuk menyertai sesi temuduga. Awda telah dipilih secara rambang daripada senarai ibubapa atau penjaga kepada kanak-kanak berumur 5 tahun yang telah menyertai pemeriksaan mulut sebelum ini.

Penyertaan awda dalam kajian ini amatlah dihargai. Awda akan ditanya beberapa soalan mengenai tingkahlaku kesihatan mulut anak awda, rawatan pergigian dan keperluan pergigian anak awda dari usia awal dan usia sekarang. Tidak kira bagaimana keadaan kesihatan mulut anak awda, kajian ini memerlukan ibubapa atau penjaga kepada kanak-kanak yang mempunyai gigi yang sihat dan tidak sihat, dan juga mereka yang pernah berjumpa doktor gigi dan yang tidak.

Perlukah saya ikut serta dalam kajian ini? Bolehkah saya menarik diri daripada kajian ini pada bila-bila masa?

Bukanlah menjadi satu kemestian untuk awda menyertai kajian ini kerana penyertaan adalah secara sukarela. Jika awda membuat keputusan untuk tidak menyertai, ianya tidak akan menjejaskan perkhidmatan kesihatan mulut awda pada masa ini dan akan datang. Jika awda memilih untuk menarik diri sebelum sesi temuduga dijalankan, awda tidak akan ditemuduga. Sekiranya awda menarik diri selepas sesi temuduga dijalankan, maka awda boleh memohon bagi maklumat atau data yang diperolehi untuk dihapuskan. Awda bebas untuk menarik diri sebelum penghuraian atau penganalisaan maklumat atau data dilakukan tanpa perlu memberi sebarang alasan dengan menghubungi Ketua Penyelidik melalui Majidi.Bakar@dental.tcd.ie

Bagaimanakah kajian ini akan dijalankan?

Jika awda memutuskan untuk mengambil bahagian, awda boleh berbincang dengan Ketua Pengkaji tentang **Risalah Maklumat** ini dan **Borang Kebenaran** dengan menghantar e-mel kepadanya di Majidi.Bakar@dental.tcd.ie. Awda bolehlah mengisikan **Borang Kebenaran** dengan menekan pautan ini: ____.

Sesi temuduga itu nanti akan diadakan secara dalam talian atau *online* melalui aplikasi **Zoom** atau **Microsoft Teams**. Sesi temuduga akan dijalankan sekitar 20 hingga 30 minit. Perbualan temuduga itu akan dirakam dengan menggunakan talian atau *online platform* tersebut. Semasa temuduga, awda akan ditanya dengan soalan tentang tingkahlaku pergigian anak awda untuk membantu kami memahaminya secara lebih mendalam.

Selepas sesi temuduga, rakaman suara awda akan ditukar kepada teks yang dapat dibaca oleh Ketua Penyelidik dan pasukan kajiselidik. Awda akan dihubungi lagi setelah sesi temuduga selesai dan awda akan diberi peluang untuk menyemak teks tersebut. Sebarang maklumat peribadi (nama dan lokasi awda) akan disembunyikan untuk melindungi identiti awda. Kami akan meminta awda untuk mengembalikan teks tersebut dengan sebarang perubahan yang awda inginkan dalam tempoh 7 hari dari tarikh awda menerimanya.

Apakah faedahnya kepada saya jika saya mengambil bahagian dalam kajian ini?

Awda tidak akan menerima sebarang faedah atau manfaat. Akan tetapi maklumat atau data yang diperolehi nanti akan dapat meningkatkan mutu perkhidmatan kesihatan mulut kanak-kanak di masa akan datang.

Apakah risikonya kepada saya jika mengambil bahagian dalam kajian ini?

Tiada risiko atau kemudaratan kepada awda jika mengambil bahagian dalam kajian ini. Jika sekiranya awda mengalami ketidakselesaan atau resah disepanjang temuduga dijalankan, sesi temuduga tersebut akan diberhentikan dan tidak akan diteruskan. Awda akan diberi sokongan awal oleh Ketua Kajiselidik dan awda akan dinasihatkan untuk membuat perjumpaan susulan bersama Pegawai Kesihatan (Contoh Doktor Perubatan awda).

Apakah yang akan berlaku kepada hasil kajian ini? Adakah saya akan dimaklumkan mengenai hasil kajian ini?

Hasil kajian ini akan dilaporkan ke dalam jurnal-jurnal perubatan dan saintifik serta akan dikongsikan bersama di persidangan-persidangan perubatan dan saintifik. Tiada maklumat peribadi awda akan didedahkan dalam mana-mana penerbitan.

Bahagian 2 – Perlindungan Data

Data peribadi apakah yang akan digunakan dalam kajian ini?

Data peribadi awda (nama, alamat emel dan nombor telefon) hanya akan digunakan untuk menghubungi awda bagi tujuan sesi temuduga dan penyemakan teks temuduga awda. Kajian ini tidak memerlukan capaian atau akses pada rekod kesihatan awda.

Siapakah yang akan mengakses atau mencapai data peribadi saya dalam kajian ini?

Hanya Ketua Pengkaji, Dr. Haji Rizan (Penyelia Klinikal) dan Malinah Samat (Penolong Rekod Perubatan) akan mengakses atau mencapai data peribadi awda sebelum, semasa dan selepas sesi temuduga.

Apakah yang akan terjadi kepada data peribadi saya yang telah diperolehi?

Kesemua data yang diperolehi akan dirahsiakan dan disimpan ke dalam *Microsoft 365* yang dilindungi dengan kata laluan, yang disokong dan dilindungi oleh perkhidmatan *Information Technology* di Trinity College Dublin, Ireland. Ianya hanya akan dapat dicapai atau diakses oleh Ketua Pengkaji dan pasukan kajiselidik yang dibenarkan.

Setelah kajian ini selesai, kesemua data yang diperolehi akan disimpan selama tiga tahun selepas Ketua Pengkaji tamat pengajiannya di Trinity College Dublin, Ireland. Tiga tahun selepas pengajian beliau selesai, semua data dalam bentuk elektronik akan dihapuskan mengikut dasar yang disediakan oleh pihak universiti.

Bagaimanakah maklumat atau data peribadi saya akan dirahsiakan?

Kerahsiaan atau privasi awda adalah penting kepada pasukan kajiselidik. Pasukan kajiselidik mengambil pelbagai langkah bagi memastikan data awda disimpan dengan selamat. Berikut adalah contoh-contoh bagaimana ianya dilakukan:

Appendix 28. Consent form for the interview session (Malay version)



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin



كەنترين كصیحتین
KEMENTERIAN KESIHATAN
MINISTRY OF HEALTH

Borang Kebenaran untuk Ibubapa/Penjaga (Bagi sesi temuduga)

Tajuk kajian: Pengaruh tabiat kesihatan mulut kanak-kanak kepada kesihatan mulut dan kesannya terhadap strategi kesihatan mulut di Negara Brunei Darussalam

Terdapat dua bahagian dalam borang ini.

Bahagian 1 memerlukan awda untuk menandakan dengan '✓' bagi setiap pernyataan jika awda 'bersetuju'.

Bahagian 2 memerlukan awda untuk menandakan dengan '✓' pada kotak 'ya' (jika bersetuju) atau 'tidak' (jika tidak bersetuju) bagi setiap pernyataan.

Sila hantarkan e-mel awda kepada Ketua Pengkaji di Majidi.Bakar@dental.tcd.ie jika awda mempunyai sebarang persoalan. Terima kasih di atas penyertaan awda di dalam kajian ini.

Bahagian 1. Pemahaman	Tandakan '✓' di dalam setiap kotak, jika awda bersetuju
Saya mengesahkan bahawa saya telah membaca dan memahami Risalah Maklumat bagi kajian tersebut di atas. Saya telah diberi peluang untuk bertanyakan soalan (jika ada) melalui emel dan semua persoalan saya telah dijawab dengan sempurna.	
Saya faham bahawa penyertaan saya adalah secara sukarela. Saya juga faham bahawa saya tidak akan menerima sebarang kesan negatif jika tidak mengambil bahagian.	
Saya faham bahawa saya boleh menarik diri dari menyertai kajian ini sebelum penghuraian atau penganalisan data dilakukan tanpa perlu memberikan sebarang alasan.	
Saya faham bahawa menarik diri daripada kajian ini tidak akan menjejaskan perkhidmatan pergigian saya yang sekarang dan pada masa hadapan.	
Saya faham bahawa saya tidak akan menerima sebarang bayaran dalam kajian ini.	
Saya tahu bagaimana untuk menghubungi pasukan penyelidik jika diperlukan.	

Appendix 29. Interview schedules for parent participants (English version)

The interview schedule included:

- an introductory overview of the study and its aim
- a few opening questions regarding any concerns with the child's oral health and any expectations of oral problems
- a set of open-ended questions exploring their children's oral hygiene routines, dietary and breastfeeding practices, as well as dental visits
- a set of open-ended questions probing the challenges barriers to accessing dental clinics related to family and the dental healthcare system
- a statement to inform parents that their children had no decayed, missing and filled teeth during the dental examination
- a closing question inviting participants to discuss anything that was relevant to them

The main aim of this interview: To understand the parent's understanding on the associations of children's oral health behaviours and oral health

General questions

1. Can you tell me about any concerns you have had about your child's oral health?
2. Did you expect these kinds of problems?

Oral hygiene habits

3. Can you tell how your child's teeth are cleaned?
3. What age did tooth brushing start?
3. What do you think of toothpaste that contain fluoride?

Dietary habits

6. Can you tell me how your child's daily diet is like now?
6. How many times per day does your child have
 - sdrink and/or snacks
 - fruits and vegetables
 - plain (unsweetened) milk?
8. Can you tell me how your child's daily diet is like when he/she was 1 year old?
8. What weaning foods did you give to your child previously? Any sugar added?

Breastfeeding habits

10. Can you tell me how did you breastfed your child?
10. When did the breastfeeding stop?
10. What do you think of breast feeding?

Bottle-feeding habits

13. Can you tell me how your child's bottle-feeding habit was like?
13. What age did you stop your child's bottle-feeding habit?
13. When do you think bottle-feeding should be stopped?

Dental visits

16. Can you tell me how your child's dental visit was like recently?
16. What was the reason for that visit?
16. Can you tell me how your child's dental visit was like before the age of 2?
16. What was the reason for that visit?
16. What might stop you from getting dental care for your child?

Other questions

21. Is there anything else you would like to talk about that we have not covered?

Appendix 30. Interview schedules for parent participants (Malay version)

Soalan umum.

1. Bolehkah biskita nyatakan apakah kebimbangan yang biskita alami mengenai dengan kesihatan mulut anak biskita?
2. Adakah biskita menjangkakan masalah seperti ini?

Tabiat kebersihan mulut.

3. Bolehkah biskita nyatakan bagaimana gigi anak biskita dibersihkan?
4. Apakah pandangan biskita mengenai ubat gigi yang mengandungi florida?

Tabiat pemakanan.

5. Bolehkah biskita nyatakan bagaimana pemakanan harian anak biskita sekarang?
6. Bolehkah biskita nyatakan bagaimana pemakanan harian anak biskita semasa berumur 2-3 tahun?
7. Apakah makanan yang biskita berikan kepada anak biskita setelah anak biskita berhenti menyusu? Ada tambahan gula?

Tabiat penyusuan susu ibu.

8. Bolehkan biskita nyatakan bagaimana biskita menyusukan anak biskita?
9. Bilakah penyusuan susu ibu berhenti?
10. Apakah pendapat biskita mengenai penyusuan susu ibu?

Tabiat penyusuan botol.

11. Bolehkah biskita nyatakan bagaimana tabiat penyusuan botol anak biskita?
12. Berapakah umur anak biskita menghentikan tabiat penyusuan botol?
13. Bilakah biskita fikir penyusuan botol sepatutnya dihentikan?

Perjumpaan pergigian.

14. Bolehkah biskita nyatakan bagaimana perwatakan anak biskita ketika sesi perjumpaan pergigian baru-baru ini?
15. Apakah sebab perjumpaan tersebut?
16. Bolehkah biskita nyatakan bagaimana perwatakan anak biskita ketika sesi perjumpaan pergigian semasa berumur 2-3 tahun?
17. Apakah sebab perjumpaan tersebut?
18. Apakah yang mungkin menghalang biskita daripada mendapatkan rawatan pergigian untuk anak biskita?

Soalan lain.

19. Apakah yang boleh membantu biskita menjaga gigi anak biskita?
20. Bagi pendapat biskita, apakah langkah-langkah yang patut dilakukan oleh Jabatan Perkhidmatan Pergigian bagi penjagaan gigi kanak-kanak yang berumur 5 tahun?
21. Adakah terdapat perkara lain yang biskita ingin bincangkan yang belum kami bincangkan tadi?

Ribuan terima kasih atas masa biskita.