

# Dental visits in early life: patterns and barriers among Australian children

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**D**ental caries is a common childhood disease, affecting almost half of all children aged 5 to 10 years in Australia.<sup>1</sup> While rates of dental caries in permanent teeth of children have decreased significantly in Australia since the 1980s, those in primary teeth have remained largely unchanged.<sup>1</sup> This is of particular concern as early childhood caries can lead to poor quality of life, failure to thrive, pain and infection, with major financial and social burdens borne by affected families.<sup>2</sup> In Victoria, dental conditions are the leading cause of preventable hospitalisations in children.<sup>3</sup> Data from Western Australia demonstrates a three-fold increase in dental general anaesthetics in the decade from 1993-2003, with pre-schoolers found to be a high-risk group.<sup>4</sup> Furthermore, childhood dental caries is the best indicator of future poor oral health, which makes preventing caries in these children a key strategy in optimising long-term oral and general health outcomes in later life.<sup>5</sup> Despite this, information about oral health status and behaviours in young children prior to school entry is lacking.

Dental caries occurs in the context of a complex interaction of individual, behavioural and social factors.<sup>6,7</sup> Even prior to tooth eruption, children may have already developed behaviours and habits that contribute to the initiation and progression of decay.<sup>8</sup> In addition, dental caries is strongly patterned by socioeconomic factors from early life.<sup>9</sup> Anticipatory guidance is therefore crucial to ensure primordial

## Abstract

**Objectives:** To determine the early dental service utilisation patterns among Australian children and investigate barriers to care.

**Method:** Randomly selected adults aged 18 years and older who were parents or caregivers of children under 18 years of age completed an online nationally representative cross-sectional survey which was then analysed using descriptive statistics.

**Results:** A total 2,048 parents of 3,660 children, including 1,179 aged between one and six years, completed the survey. Utilisation of professional dental care was low among children under six years of age, with just 118 (27.3%) at one year of age having ever received professional dental care. The most frequently reported reasons for lack of professional dental care were that the child was too young, their teeth were healthy or that the child would be scared. Cost was the fourth most frequently reported reason in young children. Only 459 (22.4%) parents knew that the first dental visit should be at one year of age or earlier.

**Conclusions:** Parents are unaware that children should have their first dental visit at 12 months, and therefore most children miss out on essential early health promotion.

**Implications for public health:** As many parents are unaware of the importance of early dental visits, integrating and strengthening oral health promotion screening and referral within broader early childhood health services is essential.

**Key words:** paediatric oral health, oral health promotion, dental

prevention (prevention of risk factors) and primary prevention (the identification and modification of risk factors). Early detection of dental caries also enables provision of active preventive therapy (such as topical fluoride application) that can arrest and reverse the disease process.<sup>7</sup> Given the significance of early life in shaping future disease risk, early dental visits that focus on prevention are an important opportunity to address health inequities throughout the life course.

This spectrum of prevention requires early engagement with children and

families, and international guidelines recommend children have their first dental examination at 12 months of age.<sup>6</sup> However, despite considerable advocacy, data from international studies suggests that attendance rates among young children remain low, reported to be only 12% of 1–2-year-olds in the UK.<sup>10</sup> Historical reports in Australia suggest that less than 40% of 3–4-year-old children attended a dental professional in 1995.<sup>11</sup> These low rates of utilisation of professional dental services have led to calls for a broader range of health professionals, including

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medical professionals and maternal child health nurses,<sup>12</sup> to contribute to oral health promotion, screening and referral.<sup>6</sup> Adoption of this model in the United States, whereby preventive oral health service provision is delivered by primary care medical practitioners, has led to both short- and long-term improvements in oral health.<sup>13,14</sup>

There are no recent data about the age of the first dental visit in Australia, and the current dental service utilisation patterns among pre-schoolers in Australia are essentially unknown. The available data is limited to only a small number of observational studies focussing on specific groups and cohorts. The aim of this study was to determine the early dental service utilisation patterns among Australian children and investigate barriers to care.

## Methods

### Study design and population

The target population for this study comprised Australian parents and carers of at least one child aged 0 to less than six years. All respondents meeting this criteria were selected from a large cross-sectional survey of a nationally representative sample of Australian parents and carers of children aged 0-17 years. The questionnaire (Supplementary File 1) was administered as part of a recurring periodic online survey conducted by a major tertiary and quaternary level paediatric hospital in Melbourne. Data were collected over a two-week period from 4 January to 17 January, 2018, by a private vendor, the Online Research Unit, with a consumer panel of over 350,000 adults living in Australia aged 18 years and over with internet access. Participants were randomly recruited to the panel using both online and offline methods and only one parent per household could complete the questionnaire. Participants were incentivised with points that could be used to redeem shopping vouchers. Responses were voluntary and data were de-identified.

A unique random sample of participants was drawn from the larger panel by the vendor using recruitment quotas to achieve a nationally representative sample of parents reflective of age, sex and estimated resident populations by Australian states and territories based on Census data from Australian Bureau of Statistics.<sup>15</sup> The sample was subsequently weighted to adjust for any minor differences in the distribution of the national population by sex and state

of residence. Among Online Research Unit panel members contacted to participate, the completion rate was 67%.

### Questionnaire

The questionnaire administered in English (at a year six equivalent level) to parents and carers and collected information on dental health service utilisation, as well as knowledge, attitudes and behaviours in relation to oral health care in children. Demographic information was also collected including parental age, sex, family structure, country of birth, indigenous status, migrant status, language spoken at home, education level, income and postcode of residence. Socioeconomic status was determined at area level, using the Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage quintiles (IRSDF).<sup>16</sup>

The questionnaire was comprised of a range of question formats, including multi-choice questions and likert scales. The study was

**Table 1: Demographics of children aged under six years.**

Child demographics	n (%), Mean [SD]
Female	549 (46.6)
Age:	
1 to < 3 years	442 (12.1)
3 to < 6 years	737 (20.1)
Household income	
\$1,000 or more per week	759 (64.4)
Less than \$1,000 per week	304 (25.8)
Missing	116 (9.8)
SEIFA Quintile	
Q1	176 (14.9)
Q2	200 (17.0)
Q3	267 (22.7)
Q4	262 (22.2)
Q5	273 (23.2)
Language Spoken at home	
Only English	955 (81.0)
Other	224 (29.0)
Migration within the last 5 years	78 (6.6)
Rurality	
Major City	923 (78.3)
Inner Regional	171 (14.5)
Outer Regional	82 (7.0)
Remote/Very Remote	3 (0.3)
State	
Australian Capital Territory	17 (1.4)
New South Wales	376 (31.9)
Northern Territory	14 (1.4)
Queensland	247 (21.0)
South Australia	77 (6.5)
Tasmania	29 (2.5)
Victoria	296 (25.1)
Western Australia	120 (10.2)

approved by the RCH Human Research Ethics Committee (Reference Number 35254, 2015).

### Statistical analysis

Data were analysed using STATA 15 (StataCorp. 2017. *Stata Statistical Software: Release 15*. TX, USA). Participant demographics and reasons associated with dental service utilisation behaviours were reported using descriptive statistics. The associations between past dental visits and sociodemographic factors were evaluated using simple logistic regression with generalised estimating equations to adjust for correlation between siblings in families. The associations were reported as odds ratios (OR) with 95% confidence intervals (CI).

## Results

### Participants

A total 2,048 parents of 3,660 children aged one to 17 years completed the survey. The median number of children per parent was two with a range from one to seven. The sociodemographic details of the children aged between one and six years of age are detailed in Table 1 and demonstrate even distribution of respondents across the socioeconomic spectrum as determined by the SEIFA score.

### Dental visiting patterns

Dental visits were uncommon in younger children, with only 26.7% (118 of 442) children aged one to two years having ever attended a dentist. Relatively more children (68.5%, n=494) aged three to five years had attended a dental service, but only a fifth of these (20.0%, 99 of 494) had their first dental visit at one year of age. Dental visits were more common among older children, with 78.7% of six to 12-year-olds and 74.4% of 13-17-year-olds reporting that they had a dental check-up in the last year.

There were no associations between SEIFA index, language spoken at home or recent history of migration to Australia and dental visits in young children (Table 2). Although young children from ACT only comprised a small proportion of the study population, they appeared more likely to have accessed early dental visits compared to other states.

The first dental visit was for a check-up for most children under six years of age (Table 3). The three most frequently reported reasons for non-attendance at a dentist are related to

parental beliefs about when and why children should attend professional dental services (Table 4). Lack of affordability was reported by almost one in five parents of children aged under six years (18.1%, n=98).

Of the 465 parents of young children (less than five years old) who reported attending a maternal child health nurse regarding their child/children's health, 252 (54.2%) were provided with oral health advice, 177 (38.1%) were advised to take their child/children to the dentist, 173 (37.2%) reported the teeth being examined and 74 (15.9%) parents were advised their child had dental problems.

### Discussion

The results of this representative survey provide valuable insight into the dental utilisation patterns of Australian children and identify several barriers to early dental care. Few children attended the dentist at the recommended age of 12 months and this behaviour was most frequently associated with parents' misconceptions about when and why children should have professional dental care.

This study also suggests barriers to lack of early dental visits are predominantly related to poor oral health literacy. As early dental carious lesions present with subtle clinical signs and mild symptoms, non-clinicians will find them difficult to detect and parents may under-estimate dental disease.<sup>17</sup> By the time symptoms manifest or cavitation is evident, and parents become aware of dental problems, the window of opportunity for prevention may be greatly diminished. At a tooth level, cavitation and dental pain are likely to require invasive, surgical treatment, either removal of decayed tooth structure and restoration or even tooth extraction.

The findings of this study suggest that there is a need for better public health policy and promotion to facilitate a focus on prevention from early life and support families navigate services.

With reported low numbers of young children accessing professional dental care at the recommended age, a more effective method to ensure early prevention-focused dental care may be through the active involvement of the healthcare community. Health professionals who interact frequently with young children may assist in oral health promotion by providing appropriate information and

**Table 2: The association between socio-demographic factors and ever having attended a dentist among young children (aged between one year and six years).**

	Ever attended a dentist	
	OR (95% CI)	P-value
Age of child		
1 to <3 yrs	1	
3 to <6 yrs	5.40 (4.19, 6.96)	<0.001
Language other than English spoken at home	0.89 (0.65, 1.21)	0.44
Migration in the last 5 yrs	1.19 (0.75, 1.87)	0.47
SEIFA Quintile		
Q1	1	ref
Q2	0.89 (0.57, 1.38)	0.60
Q3	0.92 (0.61, 1.40)	0.69
Q4	0.99 (0.65, 1.50)	0.95
Q5	1.21 (0.80, 1.83)	0.36
Rurality		
Metropolitan	1	
Inner Regional	0.95 (0.66, 1.36)	0.78
Outer Regional	0.71 (0.43, 1.17)	0.18
Remote/Very Remote	0.42 (0.04, 4.70)	0.48
State		
Australian Capital Territory	1	
New South Wales	0.28 (0.08, 1.02)	0.06
Northern Territory	0.65 (0.12, 3.61)	0.63
Queensland	0.27 (0.07, 1.00)	0.05
South Australia	0.24 (0.07, 0.93)	0.04
Tasmania	0.29 (0.07, 1.26)	0.10
Victoria	0.31 (0.06, 0.83)	0.08
Western Australia	0.22 (0.06, 0.83)	0.03

**Table 3: Reasons for the first dental visit for children aged less than six years.**

	1 to < 3 years (n=118)	3 to <6 years (n=494)	Total (n=612)
Concerns about discolouration or the appearance of teeth	7 (5.9)	10 (2.0)	17 (2.8)
Concerns about holes in teeth	4 (3.4)	18 (3.6)	22 (3.6)
Concerns about the growth of teeth	14 (11.8)	19 (3.8)	33 (5.4)
Injury (e.g. broken, knocked out, or dislodged tooth)	9 (7.6)	13 (2.6)	22 (3.6)
Routine check-up	74 (62.7)	391 (79.1)	465 (76.0)
Toothache or pain	4 (3.4)	22 (4.5)	26 (4.2)
Other	6 (5.1)	21 (4.3)	27 (4.4)

**Table 4: Reasons reported by parents for children aged less than six years never attending a dentist.**

	1 to < 3 years (n=314)	3 to <6 years (n=227)	Total (n=541)
My child's teeth are healthy	114 (36.3)	115 (50.7)	229 (42.3%)
My child is not old enough to go to the dentist	156 (49.7)	52 (22.9)	208 (38.4%)
My child would be scared of the dentist	61 (19.4)	47 (20.7)	108 (21.0%)
Dental visits cost too much	54 (17.2)	44 (19.4)	98 (18.1%)
Children only need to go to the dentist if there is a problem (e.g. toothache)	13 (4.1)	15 (6.6)	28 (5.2%)
It was too hard to find time to see the dentist	16 (5.1)	18 (7.9)	34 (6.3%)
I was unable to get an appointment (eg. my child was put on a waiting list)	4 (1.3)	6 (2.6)	10 (1.8%)
It was too hard to travel to the dentist	5 (1.6)	6 (2.6)	9 (1.7%)
I do not like to go to the dentist myself	11 (3.5)	12 (5.3)	23 (4.3%)

support in a timely and effective manner.<sup>6,18</sup> For example, paediatricians, child health nurses and general medical practitioners are well positioned to deliver education, guidance and early referral due to frequent contact with children early in life. In Victoria, first time parents are visiting primary health care services (excluding dentists) as often as once a fortnight over the course of the first 12 months of an infant's life.<sup>19</sup> In the United States of America, Medicaid schemes reimburse medical officers (such as physicians, medical nurses and paediatricians) to evaluate, risk assess, refer as needed and apply fluoride to all teeth in children under five years of age at the 'well-child' visits. Studies have shown positive long-term outcomes, with data suggesting lower rates of caries in children who have had preventative oral care at non-dental offices and are less likely to require a dental general anaesthetic.<sup>13,14</sup> A study of Australian paediatricians found that despite their awareness of the importance of oral health, significant barriers impeded provision of oral health advice, including lack of professional training, addressing more pressing health concerns and poor knowledge of onward referral pathways. Although 93% of Australian paediatricians reported they had children with oral health problems in their clinic, only 40% would perform an oral health examination. Participants demonstrated a willingness for further training to increase their confidence in recognising oral disease.<sup>20</sup> Oral health care delivered by non-oral health practitioners might have the potential to positively influence oral health practices and increase dental visits for children at 12 months of age. As with any implementation of new approaches, this would need to be evaluated for its effectiveness in achieving the desired outcome.

In Victoria, the Maternal and Child Health (MCH) Service is a government-funded nurse-run service which provides monitoring of the health, growth and development of infants and children from birth to school age, as well as support for families. Up to 40% of all health care visits by parents in the first 12 months of an infant's life are for MCH visits<sup>19</sup> and this therefore provides a unique opportunity to integrate oral health education with a child's general wellbeing visit. As demonstrated by our study, of the children that had attended an appointment with the MCH nurse, approximately half were given oral health education and only 38%

were advised to see a dentist. By developing guidelines, education and training to MCH nurses, there is potential to improve these figures. The Early Childhood Oral Health program (ECOH) provided in the Australian state of New South Wales demonstrated that incorporating child health professionals like MCH nurses can be effective for early referral to oral health services. In the first three years of initiating the program, there were over 3,400 referrals with the largest proportion of referrals received for children of one year of age (27.5%).<sup>21</sup> However, the effect of the service on oral health outcomes is unclear and needs consideration. MCH nurses have expressed a need to collaborate with other health professionals to provide ongoing oral health support for families<sup>22</sup> and this could include preschools, antenatal clinics and medical centres.

It has been demonstrated that children who visit the dentist early in life are more likely to continue with preventative visits. Studies have suggested that these children have been found to have less restorative needs and thus incur less cost compared to children who access care later in life.<sup>23,24</sup> Furthermore, building a positive relationship with the dental team early, having regular and positive visits will reduce the likelihood of developing anxiety in the dental environment, a concern cited by 19.4% parents in the survey. Regular and consistent oral health information throughout childhood, appropriate use of remineralisation agents and prompt referrals to dental services at the recommended age are therefore recommended to ensure long-term improvements in health outcomes.

With dental care affordability on the decline,<sup>25</sup> it is not surprising some parents (17.2%) expressed that cost of dental services could deter them from an early visit for their child. Differences across Australian states can be confusing for parents to understand whether they are eligible for public dental care. For example, the Australian Commonwealth Government funded Child Dental Benefit Scheme (CDBS) for low-income families has not been well utilised with only 22% of eligible children seeking treatment under this scheme.<sup>24</sup> The lowest attendance rate being for those children aged two to four years.<sup>26</sup> This indicates the need for communication campaigns to support parents to access government-funded schemes, which will likely lead to better utilisation of public and subsidised dental services for young children.

The finding that dental visits are more likely in older children was also reported in the National Child Oral Health Survey (NCOHS) of Australian school-aged children, which reported that the youngest age group (five to six years) had the highest proportion of children who had not attended dental services.<sup>1</sup> However, the lack of notable differences in early dental visits across the population irrespective of area-level disadvantage, rural location and other social factors are inconsistent with NCHOS, which found that parental education and income were associated with dental visits. These differences are likely to reflect the focus on the younger age group this study, which was not included in NCOHS and suggests lack of early dental visits prior to school-age is a population-wide problem, consistent across sub-groups of the Australian population. Nevertheless, factors such as parental education and income are important determinants of dental disease severity, the implications of failure to engage with dental services earlier are likely to be much more significant in terms of future disease for these sub-groups.<sup>27</sup> Focusing on prevention there is likely to be even more important in children from families with lower levels of income, education and other social factors and offer an opportunity to address inequity in childhood and beyond.

### Limitations

There are some limitations to this study. It would have been beneficial to obtain clinical data, as this may have provided insight into the impact of dental visits on oral health. As with many survey-based studies, we have limited ability to assess the reliability and validity of data. There could be inaccurate data obtained due to possible misinterpretation of the questions or survey fatigue. Being incentivised may help increase the response rate but may potentially create bias amongst the participants depending on the appeal of the incentive. Although the survey data captured a range of socioeconomic profiles, it is unlikely to be representative of Indigenous families or families with limited literacy in English. The survey required respondents to be literate in English at a year six equivalent level for completion, which could result in some culturally diverse respondents not being well represented. Separate studies utilising qualitative methodology and investigating the barriers to dental visits and knowledge

of oral health in these populations will need to take into consideration other risk factors and ensure that the survey is translated in a culturally and language appropriate way.

## Conclusion

The belief among parents that children are too young to have their first dental visit at 12 months of age results in missed opportunities for prevention, detection and early intervention to reduce the severity and progression of oral disease. Collaboration among all health professionals who are in frequent contact with children before this first visit can address the lack of knowledge of oral health, assist in early referrals to oral health professionals and reinforce health promoting behaviour. By managing oral care as an integral part of medical health and well-being, we can aim to reduce the comorbidities associated with poor oral health and the significant associated impacts on quality of life and economic costs.

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## Supporting Information

Additional supporting information may be found in the online version of this article:

**Supplementary Table 1:** Questionnaire.