The Beginning of Change

Queensland Child Oral Health Survey 2010-2012

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The Beginning of Change. Queensland Child Oral Health Survey 2010–2012

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Executive summary

By A John Spencer, Kaye Roberts-Thomson and Loc Do

The two key problems in child oral health in Australia are the ongoing expense of childhood oral disease and the unfavourable pattern of use of dental services. There is a need to respond by extending and improving population and individual-level prevention of oral disease, and the organisation and use of dental services and delivery of dental services that holds children in a favourable pattern of dental care.

The ultimate purpose of this report is to describe and interpret the findings on child oral health and dental behaviours of Queensland children so as to stimulate discussion about how to meet these two challenges.

This report provides a descriptive 'snapshot' of child oral health in Queensland. In doing so it satisfied the core information needs by the use of a baseline cross-sectional Survey for the evaluation of water fluoridation in Queensland and described the levels of dental decay, dental fluorosis and perceived oral health at the time of the implementation of water fluoridation. It also describes the other decay-protective factors such as toothbrushing and the use of fluoridated toothpastes. It also describes the use of dental services by children so as to manage existing oral disease and to contribute to the prevention of dental decay. Finally, it presents information on child oral health using frameworks that emphasise variation by the socioeconomic characteristics of children's households and their reported pattern of dental service use in regions of Queensland with long-term fluoridated and newly-fluoridated water supplies.

The 2010–12 Queensland Child Oral Health Survey (QCOHS) was a cross-sectional Survey of the 5–14 year old population in Queensland. The methods of this Survey were approved by the University of Adelaide's Human Research Ethics Committee and the Queensland Health Research Ethics Committee. Children were sampled through a two-stage, stratified clustered sampling strategy with schools from all three schooling sectors: public; catholic; and, independent, stratified by their area SEIFA (Socio-Economic Indexes for Areas) score into four bands, and then selected with a probability proportional to size of enrolment. Within schools clusters of children were randomly selected. In all a total of 5,407 children participated in the study from the 209 schools which participated. The participation rate of children in the selected schools did not significantly vary across the spectrum of the area characteristics of where the school was located. There were some modest variations between the distribution of the children in the sample by their parents' social characteristics and the 2011 Census data for Queensland. When un-standardised and standardised key estimates out of the Survey were compared, there was only a small bias found in those estimates. Therefore, this report presents un-standardised estimates as representative of child oral health in Queensland.

All selected children were provided with an introductory pack about the Survey for their parents. This involved an invitation to participate, an information sheet and an initial parental questionnaire. The initial questionnaire contained the parental consent to participate, and then blocks of questions. Completed questionnaires were returned to Queensland Health, the consent for the oral epidemiological examination was identified, and then the questionnaire was forwarded to the Australian Research Centre for Population Oral Health (ARCPOH) at the University of Adelaide, for data preparation.

Some 21 dental examiners participated in a calibration program involving written and CD-ROM guidelines for the examination, didactic learning and interactive group discussion, and several sessions of examinations on children of a similar age to those to be surveyed. Refresher sessions were held across the period of the fieldwork for the Survey. Two experienced oral epidemiologists from ARCPOH acted as 'gold examiners' for test-retest examinations conducted on an ad hoc basis across the Survey fieldwork. Examiners used standardised conditions where possible and examinations used mirrors and compressed air, but not explorers or radiographs to evaluate all teeth present.

Dental caries was classified for five surfaces per tooth: mesial, buccal, distal, lingual, and occlusal/incisal surfaces. Decay was classified using visual evidence of enamel cavitation and/or carious dentine. A surface was classified as filled if restored to treat caries. Intra-class-correlation coefficients of reliability for the primary dentition's decayed, missing or filled (dmf) index score were 0.85 at the tooth-level and 0.97 at the person-level and for the permanent dentition's DMF were 0.85 at the tooth-level and 0.91 at the person-level among examiners compared to the study reference examiner in masked, replicated examinations of 83 study participants. Intra-class-correlation coefficients of reliability for Thylstrup & Fejerskov (TF) score for fluorosis were 0.85 at the tooth-level and 0.98 at the person-level.

Various methods were used to investigate the potential that bias might be present in estimates from the Survey. Firstly, response rates were examined by area-level socioeconomic indicators. The correlation between participation rates at the level of school postcodes and SEIFA scores (ABS 2011) for the corresponding geographic areas indicated that response rates were similarly distributed across the range of scores and the data points indicating no significant relationship between postcode response rates.

Secondly, key characteristics of the sample were compared to Census population benchmarks. The results from the total population differed slightly from QCOHS estimates regarding parents' country of birth, labour force status, type of household, household income and residential location. Therefore QCOHS estimates of oral health were adjusted to reflect the Census distributions of the population in question. Differences between observed estimates and adjusted estimates were smaller after standardisation of Survey estimates to the Census distribution of all variables. Most adjusted percentage estimates differed by no more than 1% in absolute value.

Child oral health

Dental caries

Dental caries was the most prevalent and important oral disease in Queensland children.

- Just less than one-half of children aged 5–10 years had experienced caries in their primary teeth. On average, children had 1.9 primary teeth with caries experience.
- However, slightly less than one-quarter had 4 or more primary teeth with caries experience.

These estimates are reasonably close to those derived from the surveillance of child oral health within the Queensland school dental services which places Queensland children at the higher end of caries experience in the primary dentition of children across states and territories.

- Just over one-quarter of children aged 6–14 years had experienced caries in their permanent teeth. On average, children had 0.6 permanent teeth with caries experience.

- However, just less than one-half of children aged 12–14 years had experience of dental caries with 1.4 teeth affected.

- About one in seven children had 2 or more permanent teeth with caries experience.

These estimates are somewhat lower than those from the surveillance of child oral health within the Queensland school dental services. This may indicate a bias in estimates derived from the school dental service.

Childhood caries experience shows reasonably consistent social patterning.

- Childhood caries experience was consistently higher among children from households where parents had less education and low incomes. There were also indicators of childhood caries experience that showed significant variation by Indigenous identity and residential location.

Caries experience of Queensland children was examined across four regions: Townsville (fluoridated in 1964; rest of Northern; Brisbane Metropolitan; and rest of the South-East (most of these areas have been fluoridated post-2008).

- Within the four Queensland regions, children in Townsville had the lowest prevalence of caries and lowest mean caries experience scores (dmft or dmfs) in the primary dentition.

- The comparison of Townsville with the physically closest other region – the rest of the Northern region of Queensland – showed very substantial differences between fluoridated Townsville and previously non-fluoridated remainder of the Northern region.

- For instance, the prevalence of caries in the primary dentition was only 38.8% in Townsville with a mean primary caries experience of 1.3 teeth, while in the remainder of the Northern region the prevalence was 57.2% and the mean caries experience was 2.2 teeth.

- Further, the prevalence of caries in the permanent dentition among children aged 12–14 years was only 34.7% in Townsville with a mean primary caries experience of 0.7 teeth, while in the remainder of the Northern region the prevalence was 46.7% and the mean caries experience was 1.3 teeth. The corresponding figures among children aged 12–14 years in Brisbane and the rest of the South-East region were similar or slightly higher than that of the rest of the Northern region.

Regional variations in dental caries experience

The long-term fluoridation of Townsville was associated with substantially lower levels of caries in both the primary and permanent teeth when compared to the rest of the Northern region of Queensland and lower levels against both Brisbane and the rest of the South-East region of Queensland. This documents the starting point for the fluoridation of Queensland water supplies post-2008.

Dental fluorosis

Australia's guidelines on the use of fluorides have given primacy to the continued fluoridation of water supplies between 0.6 and 1.1 mg/L water depending on climate. In Queensland, the level has been set at 0.8mg/L in Brisbane and the South-East region, 0.7mg/L in Central and 0.6mg/L in the Northern region. In principle this is to accommodate variation in water consumption by climate so as to maintain a similar exposure to fluoride in water supplies. The actual population exposure is set to achieve a near maximal reduction in dental caries without an unacceptable level of dental fluorosis. Water fluoridation is associated with an increase in the prevalence of any fluorosis. However, all the fluorosis observed is expected to be at a very mild or mild level.

The baseline prevalence and severity of fluorosis has been established in the long-term fluoridated region of Townsville and in the remaining regions of Queensland.

- Any fluorosis (a TF score of 1+) was found to have a prevalence of 8.2%.
- The distribution of fluorosis scores was dominated by TF 1 (5.5%) and TF 2 (2.3%).
- A small percentage (0.3%) of children had more definitive dental fluorosis (having a TF 3 score).
- Only six children (0.1%) across Queensland had a TF score of 4 or 5 indicating moderate or severe dental fluorosis. Three of those children were from the Brisbane area, and one from each of the other three regions.
- In Townsville, the prevalence of any dental fluorosis was 11.3% and in the remainder of the Northern region the prevalence was 10.6%. The other two regions had a slightly lower prevalence of any dental fluorosis.
- There was little variation in the prevalence of fluorosis by social characteristics of the child.
- The prevalence of non-fluorotic opacities was 7.9% with little variation across population sub-groups.

It is important to recognise that non-fluorotic changes to dental enamel were differentially diagnosed from fluorotic changes. Non-fluorotic changes had a reasonably similar prevalence to fluorotic changes. Without specific training in the diagnosis and measurement of fluorosis such non-fluorotic changes are frequently labelled as fluorosis. The examiners in QCOHS had received extensive specific training in differential diagnosis of dental fluorosis versus non-fluorotic opacities.

Dental fluorosis

The long-term fluoridation of Townsville was associated with only a marginally higher prevalence of dental fluorosis than the rest of the Northern region and both Brisbane and the rest of the South-East region of Queensland. This was an indication that much dental fluorosis arises from exposure to fluoride from sources other than from water fluoridation. However, the extension of water fluoridation to much of the remainder of Queensland calls for ongoing monitoring of dental fluorosis.

Dental care

Access to dental care is a major policy issue in Australia. This report has focussed on Queensland children's first visit to a dental provider and the current visiting behaviour.

There is variation among dental authorities about the recommended age at which a child should make their first dental visit. Some dental professional groups have recommended that a child should make their first visit soon after the eruption of their first teeth. Public health groups have tended to recommend that a child make their first visit at around 2 years of age. It is for this reason that this report has documented the proportion of children who have made their first visit at 2 years of age or younger.

- About one-fifth of children have made a visit at 2 years of age or younger.
- This proportion was similar across children who at the time of the Survey were aged from 5–14 years. It has therefore been quite stable over time.
- The percentage was higher for children in households where the parents had higher education, income, and who lived in major cities. The percentage was lower among Indigenous children and children who made their last dental visit for a dental problem.

A dental check at around 2 years of age is recommended so as to identify children with early stages of dental caries in the primary teeth which can be arrested or reversed with changes to diet at home, individual dental behaviours, and preventive measures like the application of fluoride varnish.

- Just less than one in three children have never made a dental visit at 5–6 years of age. This percentage falls away sharply as children move through their early schooling.
- Furthermore, only two-thirds of Queensland children who have made a dental visit reportedly have a regular pattern of dental visiting.

The converse to regular visiting is irregular visiting.

- Just less than one-quarter of the children had an irregular visiting pattern.
- This proportion was reasonably similar across the age groups. It was higher among those children from households where parents had less education or low income. It was also lower among those children whose reason for their last dental visit was a dental problem.
- The school dental services were the place of last visit for approximately 55% of Queensland children.
- The percentage of children who last visited the school dental service increased across age groups from children aged 5–6 years to 9–10 years, then decreased through to children aged 13–14 years.
- The use of the school dental service is socially patterned with a higher percentage of parents with less education and low income reporting that their child last visited the school dental service. There is also a relationship with residential location, with higher percentages of parents reporting their child last visited the school dental service in regional and especially remote areas.

A greater percentage of children's parents reported that location was the reason for their choice of dental 'clinic' for their child rather than cost, perceived quality of the care or emphasis on prevention. Just over one-half of all responses from parents indicated that location was the reason for choice of dental clinic. Slightly more than one-quarter of all responses indicated that quality of care was the reason, while just less than one-quarter all of responses indicated that cost was the reason. A disappointing one in ten of the children's parents reported that an emphasis on prevention was the reason for choice of dental clinic.

Dental service use

- The 80% of children who have not made a visit at 2 years of age or younger, or the nearly one-third who have never visited a dental provider by the age of 5–6 years attested to the substantial change required in dental visiting early in a child's life.
- Although the proportion of children with irregular dental care was not high, this is a difficult group to access and to modify their behaviour. While irregular visiting was associated with parental education and income, this was only a modest strength of association. The majority of children in low parental education and low income households are not irregular visitors, and more children with an irregular pattern of dental visiting exist in households above the low parental education and income groups. This creates a policy challenge in that these children are not readily identified and targeted.
- Regardless of whether parents seek care for their child through the school dental services or private practices there needs to be an active management of each child's frequency of visiting. This is required to reduce or eliminate that percentage of children who have unacceptable periods of no visits and who exist largely outside the dental system. There needs to be stronger recognition of the desirability of varying the frequency of visits according to risk of disease.

While the central focus on dental visiting is to move all children into a pattern of regular dental visits with the time interval between visits dependent on their needs; a further aspect of access concerns the nature of the care they receive. The first step in this should be the provision of clinical preventive services.

Several clinical preventive services have well-established efficacy. These include fluoride varnish and fissure sealants. The efficacy of dental sealants is high if they are applied to a tooth soon after its eruption into the mouth.

- Only 22% of children aged 6–14 years had one or more sealant and, on average, only 0.6 permanent molars had a sealant placed.

- The vast majority, three-quarters, of parents rated the dental care their child received to be of high quality. This varied little in the social position of the family, with only household income being associated with this rating.

In-office preventive measures

Both the percentage of children with a fissure sealant and the number of teeth with this preventive treatment was low and left room for a greater application of this approach in clinical prevention.

Dental health behaviours

- Approximately half of the children commenced toothbrushing with toothpaste before 18 months of age.

While some children may have brushed even earlier without toothpaste, most children begin brushing with toothpaste. It is recommended that children's teeth be cleaned (wiped or brushed) from the time of the eruption of teeth, but that toothpaste be introduced at 18 months of age.

- Children in families whose parents have higher educational attainment and income have a higher likelihood of early use of toothpaste. Conversely, Indigenous children and children whose parents were born overseas and children who made their last dental visit for a problem have a lower likelihood of brushing early with toothpaste, and they have a higher likelihood of the delayed use of toothpaste.

- Three-quarters of children aged 5–6 years were brushing with a low-fluoride children's toothpaste.

Such toothpaste is recommended up to 6 years of age (ARCPOH 2006).

- Nearly three-quarters of the children were reported to brush their teeth the recommended twice a day.

- The remainder tended to brush less frequently, predominantly once a day.

- Brushing twice a day was more common among those children in households where the parents had higher levels of education and income and living in major cities. A lower percentage of Indigenous children brushed twice a day.

A particular aspect of the community context which shapes the oral health of children is the oral care product market. The oral care product market is a powerful influence in shaping the values and beliefs and the day-to-day preventive behaviours of children and their parents.

Dental services also have a positive role to play in reinforcing orally healthy behaviours and supplementing everyday activity to promote oral health with specific preventive measures where appropriate. It is crucial for dental providers to reinforce the messages about positive oral health and to support wider oral health promotion campaigns.

The identification of the numerous factors and the relation between them at an individual child, family, school and community level poses both difficulties and opportunities for programs to improve child oral health and reduce social inequalities in child oral health.

The opportunity exists for some selectivity in the actions included. The existence of a number of factors at a single level actually creates a wide variety of actions from which to choose.

Dental health behaviours

- The issue of the balance of prevention of caries and dental fluorosis becomes a more important matter in areas with water fluoridation and consideration might be given to a campaign to inform parents in Queensland about the Australian Guidelines for the use of fluoridated toothpaste.
- The effective promotion of individual-level dental health behaviours needs to be coordinated and reinforced across all sectors associated with oral health. Each contributor to shaping dental health behaviours needs to support and reinforce key messages and behaviours by children and their families.
- There is a compelling argument for giving priority to actions to improve child oral health that are more universal, i.e. reach large numbers of children, are more passive, i.e. require little individual effort, and are more proportionate, i.e. benefit most those with the greatest burden of oral disease. While this might start with water fluoridation it needs to be combined with actions at other levels which is also consistent with the criteria for improving child oral health.

1. Introduction

By A John Spencer

Australian children have experienced a high level of oral disease. In the immediate post-WW2 period Australian children had one of the highest levels of dental caries (decay) among comparable developed countries. There have been two different directions pursued as a response to this public and oral health problem: the use of fluoride both in public water supplies and fluoridated toothpastes as a preventive approach to dental caries; and support for access to dental services for school-aged children initially though the Australian School Dental Scheme and then more recently through a mixture of state and territory public dental services and subsidised private health insurance.

By the latter part of the 2000-decade Australia's oral health surveillance activities had reported a marked improvement in experience of dental caries and use of dental services. Children's experience of dental caries is strongly age-related. At the beginning of school, at age 5–6 years, a little more than half of the children have had experience of decay in their primary/deciduous (baby) teeth with an average of two teeth with decay experience. At the end of primary school, at age 12 years, most primary teeth have exfoliated and the successor and additional posterior permanent (adult) teeth have erupted. A little less than half of all children have had some experience of decay in the permanent teeth, but on average they have experienced only one tooth with decay. However, the distribution of decay experience at both ages is skewed. Many children have no or very low experience of decay, while a small minority have experienced much higher levels of decay. This small minority with high levels of decay experience is at greater risk of developing further decay as they mature through adolescence and young adulthood.

Most children now report visiting a dental provider in the last 12 months and many have a pattern of visiting that fits well with a recommended visiting pattern: visiting a known provider for a check-up at least every two years with the interval determined by individual needs. However, there is a small minority who do not visit at an acceptable regularity for a check-up, or to the same provider. This minority of children includes some children with no or minimal disease experience, but also some with high levels of experience of dental decay. The overlap of the high disease experience group and those with an unfavourable visiting pattern is only partial. Further, while membership of these groups is associated with socioeconomic circumstance, it is not tightly clustered among those of lower socioeconomic circumstances. A minority of low socioeconomic background children are members of these groups. Instead membership is spread from low through to high socioeconomic circumstance children.

As a result two key policy challenges confront those concerned about population oral health. First, extending and improving the effectiveness of the efforts to prevent dental caries in children. Second, organising and delivering dental services in a way that captures and services children who have an unfavourable pattern of dental visiting. It is toward these two challenges that much population oral health surveillance and research related to Australian children is directed.

Several levels of activity in child population oral health have been involved. Surveillance on child oral health, that is ongoing collection of core indicators of child oral health, has been conducted since 1977 through the state and territory school or community dental services. This time-series information has provided a robust picture of the trends in child oral health. Its ongoing collection also provides an early warning of any change in child oral health. However, there has been a decrease in the reach of the state and territory school or community dental services, and information derived from these services is presented with the caveat that it represents only the

users of those dental services. The picture of child oral health from those data is likely to be biased, but the extent of that bias is difficult to assess as Australia has little population survey data on child oral health with which to compare. So another level of activity needed is periodic population surveys. The Australian National Oral Health Plan calls for population oral health surveys of child and adult oral health each five years, alternating between a focus on children and adults. The National Survey of Adult Oral Health (NSAOH) was conducted across 2004–06 by the Australian Research Centre for Population Oral Health and the state and territory public dental services. The National Oral Health Plan calls for a national survey of child oral health some five years later. Unlike surveillance activity, such national surveys are built around population samples and the collection of extensive information on the social circumstance of the participants, preventive and risk dental behaviours, and dental visiting. Nowadays such national surveys include a combination of oral epidemiologic (clinical) and self-reported oral health indicators. A further level of activity is observational research on child oral health. Such research is distinguished from surveys *per se* by the presence of specific hypotheses that drive aspects of the information collected and the analyses performed. However, research hypotheses can also be in-bedded into survey procedures, greatly increasing the usefulness of the survey information.

It is timely to be considering all three levels of activity about child oral health in Australia at the end of the 2000-decade, especially in Queensland. Queensland has been the notable exception among Australian states and territories in the implementation of water fluoridation as the backbone of prevention efforts for dental caries. In 2008, only 4.8% of the Queensland population lived in an area with water fluoridation, predominantly Townsville which had been fluoridated in 1964. However, in 2008 the Bligh government passed the *Queensland Fluoridation Act* which mandated the extension of water fluoridation to all Queensland. The implementation plan foreshadowed the roll-out of water fluoridation over the next few years, reaching over 90% of the Queensland population. There was a need to establish a baseline for future comparison under this public health policy. Sufficient information should also be available to place the implementation of water fluoridation in a wider context of the use of fluorides and other approaches for the prevention of dental caries and other oral health conditions.

Another reason that survey and research activity is timely relates to the issue of access to dental services. Across the 2000-decade there has been increasing interest in the problem of social inequalities in oral health and access to dental services for professional preventive services and treatment of existing oral disease. Australia has had a spasmodic history of investing in dental services for children both to reduce present infection, discomfort and pain, and as an effort to reduce future oral disease. Across the 1970s the Australian government provided special purpose grants to the states and territories to provide school dental services. However, these grants ceased in 1981. In 2007, the Rudd Government re-entered to financing of dental services for children after a gap of about 25 years of no direct involvement of the Australian government in the financing of dental services for children. The Teen Dental Plan supported diagnostic and preventive dental services for eligible teens, regardless of which service provider they visited. While this renewed involvement in the financing of dental services for children was welcomed, there was still considerable discussion of the need to expand this role. In 2008, the National Health and Hospitals Reform Commission recommended a universal social insurance program for dental services, including for children, and specific funds to re-invigorate the provision of school dental services by the states and territories. Access to dental services for children was very much back on the policy agenda. Therefore, there was a desire to inform policy-makers and dental service providers on shaping effective dental service delivery.

Hence, there was a proposal to conduct a nationwide survey of child oral health that would provide a combination of an oral epidemiological examination and a social survey of dental

service use, service-mix received, and other determinants of oral health in line with current international standards for large-scale oral epidemiologic studies and to link these data to the underlying variation in dental service delivery systems.

1.1 Genesis of the Queensland Child Oral Health Survey

Soon after the passage of the *Queensland Fluoridation Act* late in 2007, discussion began on the conduct of a series of cross-sectional surveys that would evaluate the effectiveness of the implementation of water fluoridation in the state. At the same time the proposal was being developed to conduct the National Child Oral Health Survey in Australia in 2011–14. The Queensland Child Oral Health Survey needed to be conducted close to the time of the implementation of water fluoridation, which was ahead of the planned timing of the National Child Oral Health Survey. Therefore, the Queensland Child Oral Health Survey was initiated to be both the baseline cross-sectional Survey for the evaluation of water fluoridation and a 'preliminary survey' to develop the methodology for the National Child Oral Health Survey.

1.2 Management of the Queensland Child Oral Health Survey

In 2009, Queensland Health agreed to fund the Queensland Child Oral Health Survey. The Survey was funded under a research grant agreement with The University of Adelaide with funding across five years. The Australian Research Centre for Population Oral Health was to administer the Survey. This involved planning, development of the oral epidemiological examination procedures and capture of data, design of the social survey questionnaires, sampling, training of the dental examiners, all data preparation and cleaning, analysis and reporting. Queensland Health provided input in terms of the coordination of fieldwork activities and, through its health regions, seconded staff for the oral epidemiological examination teams.

Overseeing the Survey was the Queensland Child Oral Health Survey Management Committee made up of ARCPOH and Queensland Health staff. Periodic reporting on progress and financial matters was also required by Queensland Health.

1.3 Purpose of the Survey

The purpose of the Queensland Child Oral Health Survey was to provide a baseline for the evaluation of the roll-out of water fluoridation across the state over 2009–12, and to contribute Queensland's component of the National Survey of Child Oral Health.

The specific aims of the Queensland Child Oral Health Survey in terms of the evaluation of water fluoridation were to establish a baseline observation of child oral health against which further cross-sectional surveys across a 10-year period could:

1. Evaluate changes in levels of dental decay, dental fluorosis and perceived oral health in children living in communities that will be fluoridated, comparing results with children living in communities already fluoridated;

2. Identify contributions of other decay-protective factors (including sources of fluoride other than drinking water) and decay-risk factors to dental decay;

3. Document child dental health and its variation by region, socioeconomic characteristics of children's households, and pattern of dental service use.

1.4 Purpose of this report

The purpose of this report is to provide a descriptive 'snapshot' of child oral health in Queensland. This satisfies the core information requirements out of the baseline cross-sectional Survey by describing the levels of dental decay, dental fluorosis and perceived oral health at the time of the implementation of water fluoridation across most of Queensland. It also describes the other decay-protective factors such as toothbrushing and the use of fluoridated toothpastes and use of dental services or decay-risk factors such as dietary exposures to extrinsic sugars. It presents the information on child oral health using frameworks that emphasise variation by socioeconomic characteristics of children's households and their reported pattern of dental service use, and by region. The regions have been formed so as to allow 'ecological' comparisons of areas with long-term water fluoridation and those newly fluoridated. The regions are also comparable to those of earlier research.

However, it is not the intention of this report to present a more analytic approach to variation in child oral health in Queensland by exposure to fluoridated water. Such research activities will be reported in accompanying scientific articles published in scientific journals. Neither is it the purpose of this report to address the specific aims of the National Survey of Child Oral Health. Those aims will be pursued when all participating states and territories have completed data collection, and will be addressed in subsequent reports and scientific papers.

1.5 Organisation of this report

This introductory chapter briefly outlines the context in which the Queensland Child Oral Health Survey was conducted and explains the focus of the report. Chapter 2 outlines the methodology of the Survey and the reliability of the oral epidemiological data collected. Chapter 3 examines the representativeness of the population sample and possible bias in estimates of child oral health. Chapters 4, 5 and 6 present the descriptive findings on child oral health, use of dental services and dental behaviours. Chapter 7 presents comparisons of key Survey findings against existing surveillance data to establish trends in oral health, use of dental services and dental behaviours. Chapter 8 presents an interpretation of the findings.

2. Survey methods

By Loc Do, Anne Ellershaw, Kaye Roberts-Thomson, Katie Beckwith, Gloria Mejia and Zoe Johnston

2.1 Study population and sampling

The target population for the Survey was Queensland children aged 5–14 years. To draw a representative sample of children from this target population a stratified two-stage sample design was implemented. In the first stage, a sample of schools was selected from a sampling frame of schools located within Queensland. In the second stage, children were sampled from each selected school.

Queensland was separated into two zones based on water fluoridation status. Zone 1 was defined as all regions in Queensland including metropolitan areas, rural cities and rural towns that did not have water fluoridation in 2008, but were scheduled to be fluoridated by 2011. Zone 2 was defined as the Townsville region, which had been fluoridated since 1964, and was the largest region in Queensland with water fluoridation.

The sampling strategy was designed to derive accurate population estimates of the oral health of Queensland children, and to make valid comparisons between the oral health of children in fluoridated and non-fluoridated regions. As Zone 1 was a much larger geographical region than Zone 2 there were significantly more schools listed on the Zone 1 sampling frame. As a consequence a different sampling methodology was implemented in each zone.

Zone 1

To sample children across the age range of 5–14 years both primary and secondary schools were in-scope of the Survey. A sampling frame of schools was created from a list provided by Queensland Health which included all state, Catholic and independent primary and secondary schools. Information provided on the sampling frame for each school included school code, school name and address, school type, school enrolment and health district location.

Schools were excluded from the sampling frame if they were:

- located in very remote locations that would be difficult to access by the mobile dental clinic van
- special schools
- located in the few towns with fluoride already added to the water supply
- located in towns with enough natural fluoride in the local water
- located in towns with a small population size.

There were 1,310 schools on the sampling frame with 916 primary only, 218 secondary only and 176 combined primary/secondary schools. To ensure selected schools were adequately spread across all geographic regions within Zone 1,172 schools were sampled with the aim of examining between 5–7 children in each year level per school. The 172 selected schools consisted of 79 primary only, 66 secondary only and 27 combined primary/secondary.

Schools on the sampling frame were stratified into three broad regions based on geographic information provided by Queensland Health – Northern, Central and Southern. The number of primary and secondary schools selected from each region was determined by the region's percentage share of total school enrolment. For primary schools, enrolment was defined as children enrolled in year levels Prep to Year 7. For secondary schools, enrolment was defined as children enrolled in year levels 8 to 10.

Combined primary/secondary schools were grouped with secondary only schools for selection purposes. Table 2.1 summarises the selection of secondary schools by region. The allocation of number of schools to each region based on the regions total Year 8 to 10 enrolment, and the actual number of schools selected in each region is provided. A larger number of schools were selected in the Northern region than that suggested by the allocation to ensure the region was adequately represented. Of the 93 secondary schools selected, 66 were secondary only and 27 were combined primary/secondary.

Table 2.1: Selection of secondary schools by region

	Northern	Central	Southern	Total
% of Year 8 to 10 enrolment	11.0%	41.4%	47.6%	**100.0%**
Secondary schools allocation	10.2	38.5	44.2	**93**
Secondary schools selected	14	38	41	**93**

To ensure a geographical spread of secondary schools within each broad region the sampling frame was sorted by Queensland Health District within region. Schools were then selected systematically using probability proportional to size sampling where size was defined as the schools Year 8 to 10 enrolment.

The number of secondary schools selected by school type (state/Catholic/independent) is summarised in Table 2.2. The percentage share of Year 8 to 10 enrolment by school type, and allocation of number of schools based on this enrolment is provided for comparison.

Table 2.2: Selection of secondary schools by school type

	State	Catholic	Independent	Total
% of Year 8 to 10 enrolment	61.4%	19.3%	19.3%	**100%**
Secondary schools allocation	57.1	18.0	17.9	**93**
Secondary schools selected	57	18	18	**93**

The total number of primary schools sampled was 106 with 79 primary only and 27 combined primary/secondary schools selected. The number of primary schools sampled from each region was based on the region's percentage share of total Prep to Year 7 enrolment. A larger number of schools were selected in the Northern region than that suggested by the allocation to ensure the region was adequately represented.

To select the remaining 79 primary schools, selection was restricted to primary only schools. Schools were sorted by Queensland Health District within each region to ensure a geographic spread of primary schools across Zone 1. Schools were then selected systematically using probability proportional to size sampling where size was defined as the schools Prep to Year 7 enrolment. Table 2.3 summarises the selection of primary schools by region.

Table 2.3: Selection of primary schools by region

	Northern	Central	Southern	Total
% of Prep to Year 7 enrolment	11.2%	39.8%	49.0%	100%
Primary schools allocation	11.9	42.1	52.0	**106**
Primary schools selected	16	41	49	**106**

The number of primary schools selected by school type is summarised in Table 2.4. The percentage share of Prep to Year 7 enrolment by school type, and allocation of number of schools based on this enrolment is provided for comparison.

Table 2.4: Selection of primary schools by school type

	State	Catholic	Independent	Total
% of Prep to Year 7 enrolment	70.1%	17.0%	12.8%	**100%**
Primary schools allocation	74.3	18.1	13.6	**106**
Primary schools selected	69	19	18	**106**

To ensure that children from Zone 1 had a similar chance of selection in the Survey an equal number of children was sampled from each selected school irrespective of school enrolment size. The number of children selected per school was based on an expected consent rate of 60%. For primary only schools, approximately 84 children were selected across year levels Prep to Year 7. For secondary only schools, approximately 24 children were initially selected from Year levels 8 to 10 but this was subsequently increased to 42 due to lower than expected consent rates. For combined primary/secondary schools approximately 108 children were initially selected from year levels Prep to Year 10 but this was subsequently increased to 114 children. These numbers were expected to yield approximately 5–7 examinations in each year level per school.

The selection of children within schools was undertaken either by Queensland Health or school administrative staff depending on the schools preference. For primary schools, a list of children in all year levels was compiled which contained the child's birth date and age. Children who were aged less than 5 years were excluded from the list. A skip interval was calculated based on the number of children on the list divided by the required number of children to be selected. A random start number ranging from one to the skip interval was randomly chosen and children were sampled by applying the skip interval to the compiled list. For secondary schools, a list of children in Year levels 8 to 10 was compiled with children aged over 14 years excluded from the list. Children were sampled using the same selection method as that implemented in primary schools. For combined primary/secondary schools a list of children in year levels Prep to Year 10 was compiled.

Zone 2

There were 46 schools on the sampling frame in-scope of fluoridated areas within the Townsville region. Of these 46 schools, 32 were primary only, 9 were secondary only and 5 were combined primary/secondary schools. Due to the small number of schools on the sampling frame every school was selected. To ensure children in Zone 2 had a similar chance of selection in the Survey the number of children sampled in each school was proportional to the number of children aged 5–14 years enrolled in the school.

The selection of children was undertaken either by Queensland Health or school administrative staff depending on the schools preference. A list of children in the school was compiled which contained the child's birth date and age. Children who were aged less than 5 years or older than 14 years were excluded. To be able to examine approximately 4,000 children within the Townsville region every third child was selected from each school's list using a random start number ranging from 1 to 3.

2.2 Parental self-complete questionnaire

Questions in the questionnaire were primarily based on those used in previous surveys conducted by ARCPOH, namely the Child Fluoride Study Mark I (1991–1996) (Slade et al. 1995; Slade et al. 1996; Slade et al. 1996), Child Fluoride Study Mark II (2002–2005) and the National Dental Telephone Interview Surveys 1994, 1999, 2002 and 2010 (Harford and Luzzi 2013).

One section that was newly-developed for this Survey was the evaluation of dental services. This section was based on the National Health Performance Committee's 2001 National Health Performance Framework Report (NHPC 2001). The Report asserted that health care services should be effective, appropriate, efficient, responsive, accessible, safe, continuous, capable and sustainable. To measure performance in the dental service setting, a set of indicators was developed representing each of these nine dimensions.

The main aim of the parent questionnaire was to identify contribution of decay-protective and decay-risk-factors to dental decay. These factors included sources of fluoride, dental care, dental visiting and dietary intake. The main sections of the questionnaire covered dental practices, dietary intake, the child's health, use of dental services, evaluation of the child's dental services, and use of orthodontic services, birth place and residential movements, and characteristics of the household.

The main decay-protective-factor measured was exposure to fluoride. Lifetime exposure to fluoridated water was assessed through a number of questions on water sources at all stages of life, the use of filters that remove fluoride from drinking water and place of residence during the child's lifetime. The questionnaire also assessed additional fluoride exposure from other sources over the child's lifetime, such as toothpaste use, fluoride drops, fluoride mouthrinse, the application of fluoride at the dentist and home fluoride treatments prescribed by an oral health professional.

Use of dental services reflected the decay-protective and decay-risk-factor of dental care visiting habits. This section asked questions about the child's first dental visit, last dental visit and usual dental visits.

Current food and drink intake was included to reveal diet-related decay-risk-factors, such as consumption of sugar and soft drinks.

Additional information relevant to dental health outcomes and dental health perception was collected. This included perceived general and dental health, evaluation of dental services received at the child's last dental visit and use of orthodontic services. Household demographic information was collected, including parental socioeconomic information and household income.

2.3 Oral epidemiological examination

Information about clinical oral status was collected during standardised oral epidemiological (dental) examinations conducted by dental practitioners who undertook training in the Survey procedures. Only Survey participants who had a signed parental consent for participation and a signed medical history form were examined. Schedules for examinations were organised by the dental examination teams and Survey coordinators. Examinations were conducted mostly onsite of participating schools in mobile dental clinics or fixed dental clinics if available. A small number of children were examined at a site not at their school. In such instances, children were brought to the examination by their parents/guardians according to arranged examination appointments.

Survey participants who attended the examination first confirmed their identity according to the Queensland Health protocol. The team then explained the procedures to the child. The examiners followed a standardised protocol to record oral mucosal lesions, levels of tooth loss, dental decay experience, dental fluorosis and other types of enamel opacity, enamel hypoplasia and dental trauma. During data collection, replicate examinations were conducted for approximately five study participants per examiner to evaluate the consistency of their findings when judged against the principal Survey examiners.

Selection and training of examiners and recorders

An examination team comprised a dental examiner and a data recorder. The Survey coordinators at Queensland Health worked with local health districts to initially select a group of dental examiners and data recorders/chair-side assistants.

All selected teams undertook a special two-day training program conducted by oral epidemiologists from the University of Adelaide, namely Professor John Spencer, Associate Professor Loc Do and Professor Kaye Roberts-Thomson. Ms Zoe Johnston, the state Survey coordinator and Dr Ben Stute, Director of Oral Health Outcomes of Queensland Health, were also

in attendance at most of the training sessions. Training sessions were held in locations convenient to a small group of teams.

Prior to the scheduled training session, examiners and recorders received the Examination manual and the Data Recorder manual and a specially prepared DVD detailing the Survey protocol, coding and procedures involved in the examination, data recording and back-up processes. The manuals were written by the oral epidemiologists at ARCPOH and based on accepted protocols. The DVD, which had been filmed at the Australian Dental Association (NSW Branch) Centre for Professional Dental Development, illustrated the intra-oral procedures and demonstrated how criteria should be applied to make diagnoses and to code oral conditions.

For most of the first day of training, the teams underwent didactic learning and discussion with ARCPOH investigators. This included presentation of PowerPoint slides, viewing of the DVD and demonstration of the data entry screen. All aspects of the examination were verbally and visually presented and discussed in detail with the teams. Later in the first day, and for the whole second day, time was spent on practising on volunteer children organised by the local staff. The examiners practised all aspects of the examination on the volunteers under supervision of the trainers. The data recorders practised data entry. Each child volunteer was examined at least twice by different examiners. Areas of difference were discussed, and the rationale for decisions was explored by the trainers and examiners. Difficult decisions or interesting problems were shown to the whole group. This facilitated calibration between examiners, although inter-examiner reliability was not assessed during this training. At the conclusion of each day a tutorial was held to clarify any outstanding issues.

Scope of examination

Survey participants were examined in a supine position in standard dental chairs with illumination provided by the chair's overhead dental light. Examiners used an intra-oral mirror that additionally had its own battery-powered light source. A periodontal probe with 2mm markings was used to remove plaque and debris or to assess the contour and texture of a surface, for example when assessing non-cavitated lesions (described further below). However, sharp explorers were not used, and no radiographs were taken.

The following overview summarises criteria used to assess the main oral health variables reported in this report.

Tooth loss because of dental caries

For all children, examiners identified teeth absent in the dentition and distinguished between tooth loss because of dental caries and tooth loss for any other reasons (unerupted teeth, exfoliated teeth, teeth extracted for orthodontic reasons or lost because of trauma). Only teeth lost because of dental caries were counted in the decayed, missing or filled indices (dmf/DMF).

Dental caries experience of tooth surfaces

All teeth present were subdivided into five tooth surfaces: mesial, buccal, distal, lingual, and either occlusal (for premolars or molars) or incisal (for incisors and canines). Each coronal surface was assessed and categorised using visual criteria (no explorer was used) and one of the following codes was assigned:

- decay: cavitation of enamel, or dentinal involvement, or both were present
- recurrent caries: visible caries that is contiguous with a restoration
- filled unsatisfactorily: a filling placed for any reason in a surface that requires replacement but that had none of the above conditions
- filling to treat decay: a filling placed to treat decay in a surface that had none of the above conditions
- filling placed for reasons other than decay in a surface that had none of the above conditions (incisors and canines only)
- fissure sealant: fissure sealant visible on a surface where none of the above conditions were found
- sound: when none of the above conditions were found

Dental fluorosis experience

Dental fluorosis was assessed on the two permanent maxillary central incisors. Examiners first assessed exclusion criteria. If present, enamel opacities were differentiated between dental fluorosis and non-fluorotic opacities using the Russell Differential Diagnostic Criteria. Diagnosed dental fluorotic opacities were assessed for severity using the Thylstrup & Fejerskov Index (TFI) (Fejerskov et al. 1988), which is a 'dry' index. Teeth were dried with compressed air prior to scoring. Scores ranged from 0 to 5. If a non-fluorotic opacity was diagnosed, a score of 9 was assigned and analysed separately.

Oral mucosal lesions

Examiners systematically assessed all sections of the mouth cavity to observe presence of oral mucosal lesions. If present, oral mucosal lesions were classified as 'Ulcerated', 'Odontogenic abscess' or 'Non-ulcerated' lesion. Location and further clinical diagnosis were not recorded.

Enamel hypoplasia

Examiners assessed all teeth for presence of enamel hypoplasia that was associated with loss of enamel structure. Enamel hypoplasia was recorded as present for the primary dentition only, permanent dentition only, or both dentitions.

Trauma

Evidence and history of dental trauma was assessed visually on the six permanent maxillary anterior teeth. A history of trauma was confirmed by interview.

Data recording for examinations

Each code called by an examiner was recorded directly onto laptop computers using a Microsoft Access database specifically designed for the purpose. The database included logic checks and skip sequences to reduce the probability of recording errors. Recording was done by data recorders, primarily the dental assistants. Recorders were trained to use the database during the two-day training session for examination teams.

Procedures following the examination

At the end of the examination, study participants received a written report completed by the Survey examiner that described the main clinical findings. The report included general advice regarding dental treatment.

Assessment of inter-examiner reliability

In this Survey, examiners were dental professionals who were employees in the Queensland school dental service. A total of 21 dental examiners were involved. Whenever there are multiple examiners, there is potential for variation between examiners in their diagnostic criteria and recording of oral health indices. In order to minimise this variation three approaches were adopted. First, each examiner was given a clinical manual describing the examination protocol and a DVD that demonstrated intra-oral procedures. Each contained simple and clear codes for each component of the examination. Second, a two-day calibration training program was undertaken by all examiners. Third, within a few weeks of beginning Survey examinations, each examiner was tested against the 'gold standard examiners' to measure the degree of inter-examiner reliability. The first two approaches are described above. The remainder of this section presents the results of inter-examiner reliability.

Two principal examiners, who with the principal trainers, also conducted the repeated examinations. Arrangement was made with the state Survey coordinator and the examination teams to organise field visits by one of the gold standard examiners. The repeated examinations were conducted on a day when the examiner was conducting real examinations at a location. The gold standard examiner conducted a masked examination after the field examiner had completed examining a child. The repeated examinations were conducted in the same way as described above except that plaque and gingival indices were not re-scored because plaque and gingival changes after an examination were expected. Repeated examinations were also recorded on to the data entry screen and extracted for analysis. Data of the two gold standard examiners were pooled because of their close collaboration in producing the training materials and conducting examiners' training ensured high reliability between them.

Reliability of each examiner relative to a gold standard examiner was measured by calculating the intra-class correlation coefficient (ICC). The ICC can range from negative values to a maximum of 1.0, with higher values demonstrating greater agreement. Guidelines for interpreting the related kappa statistic propose that values of 0.2 or less represent 'poor or slight' agreement, values from >0.2–0.4 represent 'fair' agreement, values from >0.4–0.6 represent 'moderate' agreement, values from >0.6–0.8 represent 'substantial' agreement, and values greater than 0.8 represent 'almost perfect' agreement (Landis and Koch 1977).

Table 2.5: Summary of findings from assessment of inter-examiner reliability

Index	No. of examiners evaluated	No. of replicate pairs evaluated	Median reliability[(a)]
Number of primary teeth present per person	21	83	0.99
Number of permanent teeth present per person	21	83	0.99
Number of filled primary tooth surfaces per person	21	83	0.98
Number of filled permanent tooth surfaces per person	21	83	0.81
Number of decayed, missing or filled primary teeth per person	21	83	0.97
Number of decayed, missing or filled permanent teeth per person	21	83	0.91
Decayed, missing or filled status of individual primary teeth	21	2,324	0.85
Decayed, missing or filled status of individual permanent teeth	21	2,324	0.85
Number of decayed primary tooth surfaces per person	21	83	0.99
Number of decayed permanent tooth surfaces per person	21	83	0.87
Dental fluorosis assessment of maxillary permanent incisors	21	67	0.85
Dental fluorosis assessment of maxillary permanent incisors per person	21	67	0.98

(a) Numbers are intra-class correlation coefficients, except for decayed, missing or filled status of individual teeth, where the kappa statistic is presented.

2.4 Ethical conduct of research

This project was reviewed and approved by the University of Adelaide's Human Research Ethics Committee, Queensland Health's Human Research Ethics Committee and the three education sectors. Parents provided signed, informed consent together with the questionnaire.

2.5 Weighting of data for analysis

Child examination data from Zone 1 and Zone 2 were weighted separately. In Zone 1, the number of schools selected by school type (Catholic, independent and state) reflected the school enrolment numbers on the Zone 1 sampling frame. Selection of primary schools was based on total enrolment for year levels Prep to Year 7. Selection of secondary schools was based on total enrolment for Years 8 to10. As school enrolment numbers for state schools were more than 3 times as high as enrolment numbers for Catholic and independent schools, a larger number of state schools were selected in Zone 1 to reflect this. In Zone 2 all schools on the sampling frame were selected.

Child examination data in each zone was analysed to ensure that the percentage distribution of the sample by school type was similar to the percentage distribution of total enrolment by school type on each sampling frame. Where the percentage distributions varied, a factor was calculated to adjust for either over-representation or under-representation by school type. Separate factors were calculated for primary- and secondary-aged children. In Zone 1, the sample distribution for children aged 5–12 years was similar to the sampling frame distribution so the factor for these children was 1. For children aged 13–14 years, children from Catholic schools were over-represented in the sample and children from state schools were under-represented. Therefore, factors were calculated to give less weight to children from Catholic schools and more weight to children from state schools.

In Zone 2, the sample distribution for children aged 5–12 years over-represented children from Catholic and state schools and under-represented children from independent schools. For children aged 13–14 years, children from state schools were over-represented and children from Catholic and independent schools were under-represented. Separate factors were derived to correct for these differences.

Each child was assigned a factor based on their age and school type and this factor was defined as the child's initial weight. As examination response rates varied across the regional areas of Queensland, the initial weights were adjusted to ensure the age distribution of the examination data at the regional level reflected the Queensland regional age distribution. Within the Zone 1 and Zone 2 strata, substrata were defined by region and age where age was defined as single year age. Each substratum was linked to the estimated resident population (ERP) for that substratum.

In the first instance, region was defined as Statistical Area Level 4 (SA4) based on the Australian Bureau of Statistics new geographical framework, Australian Statistical Geographical Standard (ASGS), July 2011. This geography is available from the ABS website at the URL address: http://www.abs.gov.au/geography. The SA4 level is the broadest geographic level below state/territory and there are 21 SA4 regions within Queensland. Two of these regions - *Migratory - Offshore - Shipping (Qld)* and *Special Purpose Codes SA4 (Qld)* were excluded as these regions did not contain any children aged 5–14 years. Within each SA4 region, the ASGS contains smaller geographic regions defined as Statistical Area Level 3 (SA3) and Statistical Area Level 2 (SA2).

Children were allocated to a SA4 region based on their postcode of usual residence using the ABS *Postcode to SA4* correspondence file available at the URL address: http://www.abs.gov.au/websitedbs/D3310114.nsf/home/Correspondences. Some postcodes are not solely located within one SA4 region so rules were developed to assign children to the appropriate SA4 region. For postcodes where the majority of the postcode's population (more than 95%) was located within one SA4 region, all children from the postcode were mapped to that SA4 region. For the remaining postcodes, the child's suburb/locality was used to allocate the appropriate SA4 region. The ABS correspondence file *Locality to SA2* (available at the URL address specified above) was used to map suburb/locality to a SA2 region with each locality uniquely mapping to only one SA2 region. The SA2 regions were then linked to the larger SA4 regions based on the SA2 code with each SA2 code uniquely mapping to only one SA4 region.

Estimated Residential Population (ERP) counts for children aged 5–14 years were obtained from the ABS website, catalogue number *3235.0, Population by Age and Sex, Regions of Australia* available at the URL address http:// www.abs.gov.au/ausstats/abs@.nsf/mf/3235.0. This publication provides ERP counts by SA2 region by single year of age and sex as at 30 June 2011. SA2 level ERP counts were aggregated across sex and then aggregated to SA4 level to form the regional ERP population counts used for weighting.

Where the number of children examined of a particular age was insufficient in a SA4 region then the SA4 region was combined with a nearby region. The following SA4 regions were used to weight the examination data. Single year ERPs were aggregated to reflect these regions:

- Brisbane-East
- Brisbane-North
- Brisbane-South
- Brisbane Inner City/Brisbane West
- Cairns/Qld Outback
- Fitzroy
- Gold Coast
- Ipswich
- Logan - Beaudesert
- Mackay
- Moreton Bay-North
- Moreton Bay-South
- Sunshine Coast
- Toowoomba/Darling Downs
- Townsville
- Wide Bay

The weighting formula used to calculate the weight for each child is provided below:

$$w_{i,z,r,a} = \frac{N_{z,r,a}}{\sum_{i \in z,r,a} f_i} * f_i$$

where:

i= child

z=zone

r = region

a = age year (5, 6, ... 13, 14)

f_i = weighting factor for child i

$N_{z,r,a}$ = ERP for zone z, region r, age year a

2.5.1 Grouping areas into major regions

In some analyses, children residing were grouped into major regions based on geographical location of their residential postcode. Decisions made on grouping were also based on the definition of Hospital and Health Service areas that existed when the Survey was designed. Two major regions in the South-East of Queensland were divided into Brisbane metropolitan and the rest of the South-East region (named as South-East). The Northern area was divided into Townsville and the rest of the Northern area (named as the North).

The details of the four major regions are below:

Table 2.6: Major regions

Brisbane metro	South-East	North	Townsville
Brisbane – East	Gold Coast	Cairns/Qld Outback	Townsville
Brisbane – North	Ipswich	Fitzroy	
Brisbane – South	Moreton Bay – North	Mackay	
Brisbane Inner City/Brisbane West	Moreton Bay – South		
Logan – Beaudesert	Sunshine Coast		
	Toowoomba/Darling Downs		
	Wide Bay		

2.6 Reporting 95% confidence intervals to express sampling variability

There is necessarily some uncertainty about the true value within a population of any estimated value (for example, percentage) derived from a sample. This occurs even when the data are weighted and comes about because of random variability introduced in the process of selecting a sample. Because the number of possible random samples is nearly infinite, the results from any single random sample must be expressed with a degree of uncertainty. The uncertainty can be measured using statistical theory, and in this Survey it is expressed using 95% confidence intervals (95%CIs). 95%CIs can also be used as a guideline to identify differences between population subgroups that are statistically significant.

Hypothesis tests are another widely used method to identify differences between groups that exceed the margin of sampling error. Results from hypothesis tests usually are reported as probabilities, or 'P-values', and by convention, a threshold of $P<0.05$ is regarded as evidence of a statistically-significant difference between groups. There is a mathematical relationship between P-values and 95%CIs that can be summarised by two general guidelines.

1) Whenever there is a lack of overlap between 95%CIs for two groups, it is a mathematical certainty that a hypothesis test of the difference between the same two groups would yield a P-value of less than 0.05, and it could be as small as 0.005.

2) However, the criterion of non-overlapping 95%CIs is a 'conservative' method of identifying between-group differences, because 95%CIs that overlap to a small degree could, nevertheless, be found to differ to a statistically significant degree using a hypothesis test (that is, yielding a P-value of <0.05).

Hence, in this report all estimates with non-overlapping 95%CIs for two subgroups can be interpreted as statistically significant differences, while the conservative assumptions of a lack of statistical significance can be applied to estimates with overlapping 95%CIs.

2.7 Data analysis

The aim of the data analysis was to generate summary statistics describing oral health, use of dental services and dental behaviours for the Queensland child population. To achieve this, data files were constructed from the examination data entry database and the database of the questionnaire data. Data checking and cleaning were performed as necessary and the data files were merged. Summary measures of disease were computed and response categories were combined to create oral health outcome variables of interest. As described above, unit record weights were computed for each analytic data file.

Data files were managed and summary variables were computed using SAS software version 9.3. For the results presented in Chapters 4, 5, and 6, percentages, means and their associated 95%CIs were generated using SAS callable procedures from SUDAAN software release 11.0. The SUDAAN procedures used sampling weights to generate population estimates and calculated 95%CIs that allowed for the complex sampling design used in this Survey. To do so, 'with replacement' sampling was specified with two levels of stratification: broader regions and schools of the study participants.

Cross-sectional findings

Tables in Chapters 4, 5 and 6 present estimates of the frequency of oral health conditions, behaviours and dental service use. Dental caries and dental fluorosis status were presented separately for the primary and permanent dentitions. The experience of dental caries in the primary dentition was presented for three age groups: 5–6, 7–8 and 9–10 years while the experience of dental caries in the permanent dentition was presented for the 6–8, 9–11 and 12–14 years age groups. Dental fluorosis was presented for the three age groups 6–8, 9–11 and 12–14 years. All other analyses were presented for five age groups: 5–6, 7–8, 9–10, 11–12, and 13–14 years.

If a cell in a table had low count (<5) value for that cell was omitted as 'statistically not reliable'. A dash (-) was used in the cell to mark it as empty.

The tables use two measures to express frequency of oral health conditions, and use of dental services and dental behaviours:

- Prevalence was expressed as the percentage of children with a characteristic of interest. This included percentages for some characteristics that were dichotomous (for example, presence versus absence of natural teeth) and for other characteristics that were counts or multiples, categories were collapsed to create a single category of interest (for example, presence of one or more decayed tooth surfaces.

- Disease severity was expressed as the mean number, per person, of anatomical sites that had a condition of interest. Sites were teeth or tooth surfaces. To compute severity, the number of affected sites was first counted for each examined person. The mean number of counted sites per person was then computed, together with its 95%CI.

Seven grouping variables were used to classify children into different sub-groups. These characteristics are described below.

Sex

Sex was classified as 'Male' or 'Female'.

Indigenous identity

Indigenous identity was based on responses to the question 'Are you of Aboriginal or Torres Strait Islander origin?' People who responded 'Yes, Aboriginal', 'Yes, Torres Strait Islander' or 'Yes, Torres Strait Islander & Aboriginal' were classified as Indigenous. People who responded 'no' were classified as non-Indigenous. Some 153 children did not have a definitive answer to this question and were excluded from this analysis.

Parent country of birth

Parents/guardians were asked to indicate their country of birth. Responses were collated to 'Australian born' and 'overseas born' for each parent. Then it was collated between the two parents/guardians, if applicable. If either of the parents were born overseas, then the combined response would be 'overseas born'. Otherwise, the child was classified as having parental country of birth as 'Australian born'.

Parental education

Parents/guardians were asked to indicate their highest level of educational attainment. Six response options were collapsed to form three categories:

'School only': if parental responses were either 'incomplete' or 'complete school';

'Vocational training': if parental responses were either 'partial' or 'complete' vocational training;

'Tertiary education': if parental responses were either 'partial' or 'complete' tertiary education.

The highest reported level of education attainment of the parents/guardians was chosen for this variable. Some 169 respondents did not provide a valid response to this item and were not included in this analysis.

Household income

Parents/guardians were asked to choose a most appropriate category for their total household income before tax. This income included all types of incomes of all people in the household. The ten available categories were collapsed to form three groups: 'Low' (<AU$ 60,000/year), 'Medium' (more than AU$ 60,000 to AU$ 120,000/year), or 'High' (more than AU$ 120,000/year). Some 275 respondents did not provide a valid response on this item and were not included in this analysis.

Residential location

Residential location was classified as 'Major city', 'Inner Regional', 'Outer regional' or 'Remote/Very remote', based on the residential postcode of children reported in the parental questionnaire. This classification was based on the current regional definition of the Australian Bureau of Statistics.

Reason for the last dental visit

Parents/guardians were asked to provide the reason for the last dental visit of the child. The valid responses were collapsed into two categories: 'check-up' and 'dental problem'.

Analysis of trends between surveys

Chapter 7 presents an analysis of trends between this current Survey and several existing surveys of child oral health in Queensland and Australia. The available surveys are a series of Child Dental Health Surveys (CDHS) across time and a series of National Dental Telephone Interviews (NDTIS) conducted periodically at ARCPOH. The CDHS collected data from children attending the school dental service in Queensland. Two specific studies, the Child Fluoride Study (CFS) Mark 1 (1991–92) and Mark 2 (2003–04) collected social survey and oral health status data of children attending school dental services in Townsville and Brisbane. Therefore, those surveys covered just more than half of the child population in Queensland. There has been no similar population-based study of child oral health in Queensland similar to QCOHS in the last several decades. Those details should be taken into account in interpreting results of this Survey.

The CDHS data have been presented for the 5–6 years age group and the 12-years age group. The NDTIS data were used to report patterns of dental service use among Australian children aged 5–14 years. The CFS Mark 1 and Mark 2 data were used to report patterns of dental behaviours among children in Queensland.

Age group analysis aims to describe the amount of change in population health for selected age groups. Direction and magnitude of changes in oral health status, use of dental services or dental behaviours are described by comparing estimates between the surveys. Trends of the changes are discussed.

Data of the previous surveys are housed at ARCPOH. Comparable data items were extracted, managed and summary variables were computed using SAS 9.3 in a similar manner as described for QCOHS data. Percentages, means and their associated 95%CIs were generated using SAS-callable procedures for complex sampling from SUDAAN software release 11.0.

3. Study sample characteristics

By Gloria Mejia, Anne Ellershaw, Diep Ha and Carmen Koster

The Survey gathered information from a representative sample of school-aged children to describe the oral health status of the population and factors related to use of dental services and dental behaviours, as well as associated individual, family, and community factors such as the sociodemographic characteristics of the child's household.

Unlike a census, population surveys draw a sample of individuals from the target population. Given the known probability of selection, estimates may be extrapolated from the sample to the larger population of interest. Nonetheless, because not all Queensland children are included in the Survey, there is the potential that the sample does not accurately represent the population of interest. This imprecision of the estimates may be attributed to sampling variability and bias due to non-participation. Errors due to sampling depend on the sample selection strategy and can be measured statistically. The expected variability inherent to the sampling process is expressed using the 95%CI. Non-sampling error or bias is more problematic because it is more difficult to measure and control. The potential for bias due to non-participation or non-response needs to be explored further. One way of doing this is by examining key sociodemographic characteristics of the Survey sample and comparing them with the characteristics of the target population.

This chapter will present sociodemographic and region-specific characteristics of the population. To examine the potential for bias, school and child participation rates by school characteristics will be initially examined. Then, with a focus on the sample of children, response rates and non-participation bias will be examined by area-level socioeconomic indicators, and key characteristics of the sample will be compared to Census population benchmarks. Lastly, a comparison of observed and adjusted estimates of oral health indicators will be discussed.

3.1 Sociodemographic characteristics

This section presents characteristics of the study population which are used in the following chapters to describe variation in oral health outcomes of the population. Tables 3.1 to 3.5 present the estimated percentage distribution of children aged 5–14 years derived from weighted Survey data by sociodemographic characteristics. Separate tables are presented for Queensland and four regions within Queensland defined as Brisbane, South-East Queensland, Northern Queensland and Townsville. Survey estimates are provided by age group, which is defined as 5–6 years, 7–8 years, 9–10 years, 11–12 years and 13–14 years.

The sex, Indigenous identity, residential location and reason for last dental visit reflect characteristics of the child. Parents' country of birth and parents' education reflect characteristics of the child's parent(s). For example, if a child had at least one parent who was born overseas, the child was assigned to the parents' born overseas category otherwise they were assigned to the Australian born category. For parental education, the child was assigned to the category that reflected the parents' highest education level. For example, if a child had at least one parent with some tertiary education, the child was assigned to the tertiary education category. For the characteristic household income, children were assigned to an income category based on the total income of the household in which they resided. Children where the characteristic of interest was unknown were excluded from the analysis.

3.1.1 Characteristics of children in the Queensland region

Table 3.1 presents the estimated percentage distribution of Queensland children aged 5–14 years derived from weighted Survey data by sociodemographic characteristics.

There were minor variations in the distribution of Queensland children by sex. The largest difference was observed amongst children aged 9–10 years in which there were nearly 9.8% more boys than girls.

Indigenous children represented 5.2% of the total child population with a slightly higher proportion of Indigenous children in the 7–8 years age group (5.7%).

The percentage of children with at least one parent born overseas constituted just over 40.0% and did not vary markedly between age groups.

Just over half of children (51.8%) had a parent with some tertiary education and a further one-fifth of children (20.3%) had a parent with some level of vocational training. Differences by parental education across age groups were generally small; although a higher proportion of children aged 13–14 years had a parent with only school-level education (33.2%). This difference was not statistically significant.

Children were more likely to live in medium level income households (44%) than in low (35.3%) or high (20.7%) income level households. The slight variations in the percentage of children in each income category across age groups were not statistically significant.

About half of all Queensland children lived in a major city area (50.5%) and a further 19.2% lived in an inner regional area. Less than one in ten children (8.1%) lived in a remote/very remote region. There was some variation in the distribution of residential location across age groups, but none of the differences were statistically significant.

Although the majority of children made their last dental visit for the purpose of check-up (77.5%), 22.5% of children last visited for a dental problem. Prevalence of problem visiting was highest among children aged 7–10 years (approximately 26%) and lowest amongst children aged 13–14 years (approximately 18.5%).

In summary, the study population had a similar proportion of girls and boys and the majority of children were non-Indigenous. Over 40% of children had a parent who was born overseas, and over one in two children (51.8%) had a parent with some tertiary education. Children were more likely to live in medium income households (44.0%) than in low (35.3%) or high (20.7%) income households. Although there was some variation in the distribution of characteristics across age groups, in almost all instances these differences were not statistically significant.

Table 3.1: Estimated percentages of children by selected characteristics – Queensland

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
Sex						
Male	51.3	49.6	52.8	54.9	48.0	51.5
	49.4–53.3	*46.0–53.2*	*49.5–56.1*	*51.0–58.7*	*44.1–51.8*	*46.7–56.3*
Female	48.7	50.4	47.2	45.1	52.1	48.5
	46.7–50.6	*46.9–54.0*	*43.9–50.5*	*41.3–49.0*	*48.2–55.9*	*43.7–53.3*
Indigenous identity						
Non-Indigenous	94.8	94.8	94.4	94.9	94.9	95.0
	92.8–96.2	*91.8–96.8*	*91.6–96.2*	*92.3–96.6*	*92.1–96.7*	*92.7–96.6*
Indigenous	5.2	5.2	5.7	5.1	5.1	5.0
	3.8–7.2	*3.2–8.2*	*3.8–8.4*	*3.4–7.7*	*3.3–7.9*	*3.4–7.3*
Parent country of birth						
Australian born	58.7	59.8	59.4	58.0	59.0	57.4
	56.1–61.3	*55.1–64.3*	*54.7–63.9*	*53.9–62.0*	*55.0–62.9*	*51.7–63.0*
Overseas born	41.3	40.2	40.6	42.0	41.0	42.6
	38.7–43.9	*35.7–44.9*	*36.1–45.3*	*38.0–46.1*	*37.1–45.0*	*37.0–48.4*
Parental education						
School	27.9	24.9	28.5	25.1	28.0	33.2
	25.3–30.7	*21.1–29.2*	*24.2–33.2*	*21.6–29.0*	*24.6–31.7*	*28.5–38.2*
Vocational training	20.3	21.7	20.0	22.3	17.5	20.0
	18.7–22.1	*19.0–24.6*	*16.5–24.0*	*19.5–25.5*	*15.1–20.3*	*16.8–23.7*
Tertiary education	51.8	53.4	51.5	52.6	54.5	46.8
	48.6–54.9	*49.0–57.8*	*46.3–56.8*	*48.0–57.1*	*50.4–58.5*	*41.3–52.4*
Household income						
Low	35.3	32.8	33.4	38.3	34.9	37.0
	32.2–38.5	*28.3–37.8*	*29.1–38.1*	*33.7–43.2*	*31.0–39.1*	*32.4–41.9*
Medium	44.0	47.5	44.1	42.4	43.3	42.4
	41.8–46.2	*43.5–51.6*	*40.4–47.9*	*38.4–46.6*	*39.9–46.8*	*38.2–46.8*
High	20.7	19.6	22.4	19.3	21.8	20.5
	18.2–23.4	*16.2–23.6*	*18.6–26.8*	*16.1–22.9*	*18.4–25.6*	*16.5–25.3*
Residential location						
Major city	50.5	52.1	51.1	51.0	49.7	48.7
	45.3–55.7	*44.5–59.6*	*43.6–58.6*	*43.9–58.0*	*43.1–56.2*	*40.7–56.7*
Inner regional	19.2	19.4	18.2	17.5	19.4	21.6
	14.5–25.1	*13.5–27.1*	*12.4–26.0*	*12.1–24.6*	*13.7–26.6*	*15.1–29.8*
Outer regional	22.1	19.2	21.6	23.1	22.9	24.0
	17.7–27.4	*13.9–25.8*	*15.5–29.4*	*16.9–30.7*	*17.5–29.3*	*18.2–31.0*
Remote/Very remote	8.1	9.3	9.1	8.5	8.1	5.8
	5.3–12.4	*5.6–15.2*	*5.5–14.7*	*5.1–13.6*	*5.0–13.0*	*3.1–10.5*
Reason for last dental visit						
Check-up	77.5	78.9	74.6	74.5	78.2	81.5
	75.6–79.4	*74.9–82.4*	*70.9–77.9*	*71.6–77.3*	*74.9–81.2*	*77.6–84.9*
Dental problem	22.5	21.1	25.5	25.5	21.8	18.5
	20.6–24.4	*17.6–25.1*	*22.1–29.1*	*22.7–28.4*	*18.8–25.2*	*15.1–22.4*

Row 1: Proportions were computed using weighted data.
Row 2: 95%CI: confidence intervals for estimates were computed using weighted data.
Columns are arranged by age at time of Survey.

3.1.2 Characteristics of children in the Brisbane region

Table 3.2 presents the estimated percentage distribution of children aged 5–14 years who lived in the Brisbane region by sociodemographic characteristics.

In comparison to other regions of Queensland, the Brisbane region had a lower proportion of Indigenous children, a higher proportion of children with a parent who was born overseas and a higher proportion of children with a parent who had some tertiary education. The Brisbane region also had a higher proportion of children living in high income households than other regions within Queensland.

Just over half of children in the Brisbane region were male (51.9%). The distribution of sex varied among age groups with a higher proportion of males among children aged 9–10 years and 13–14 years (approximately 56%).

Only 2.4% of children in the Brisbane region were Indigenous with small variations in prevalence across age groups.

One in two children (50.4%) had at least one parent born overseas. Prevalence was highest for children aged 13–14 years with 55.7% having at least one parent born overseas. Variations across age groups were not statistically significant.

Over six in ten Brisbane children (61.7%) had a parent with some tertiary education and a further 15.5% of children had a parent with some vocational level training. Although there was some variation in educational level across age groups, these differences were not statistically significant.

Over one in four children (26.7%) lived in high income households and 31.3% lived in low income households. Variation in the distribution of household income across age groups was not statistically significant.

As expected for the Brisbane region, the great majority of children (92.7%) lived in a major city area and 7.1% lived in an inner regional area. There were no major differences between age groups with respect to residential location.

Approximately one in five children (19.0%) from the Brisbane region reported their last dental visit was due to a problem. The prevalence of problem visiting was highest among children aged 7–10 years (approximately 23%) and lowest among children aged 13–14 years (12.1%).

Table 3.2: Estimated percentages of children by selected characteristics – Brisbane

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
Sex						
Male	51.9	47.0	51.3	55.6	50.0	55.8
	48.0–55.8	*39.0–55.2*	*44.6–57.8*	*49.4–61.7*	*44.0–56.0*	*46.8–64.4*
Female	48.1	53.0	48.7	44.4	50.0	44.2
	44.2–52.0	*44.8–61.0*	*42.2–55.4*	*38.3–50.6*	*44.0–56.0*	*35.6–53.2*
Indigenous identity						
Non-Indigenous	97.6	96.7	98.5	97.8	98.3	96.9
	96.4–98.5	*92.9–98.5*	*95.3–99.5*	*94.6–99.1*	*95.8–99.4*	*93.2–98.6*
Indigenous	2.4	3.3	1.5	2.2	1.7	3.1
	1.5–3.6	*1.5–7.1*	*0.5–4.7*	*0.9–5.4*	*0.6–4.2*	*1.4–6.8*
Parent country of birth						
Australian born	49.6	50.1	49.7	50.8	53.3	44.3
	45.1–54.1	*42.8–57.4*	*41.6–57.9*	*42.7–58.8*	*45.4–61.1*	*35.0–54.0*
Overseas born	50.4	49.9	50.3	49.2	46.7	55.7
	45.9–54.9	*42.6–57.2*	*42.1–58.4*	*41.2–57.3*	*38.9–54.6*	*46.0–65.0*
Parental education						
School	22.8	21.0	25.1	21.0	20.8	26.4
	18.8–27.4	*14.2–30.1*	*18.6–32.9*	*15.6–27.7*	*16.7–25.7*	*17.3–38.1*
Vocational training	15.5	13.7	15.0	18.1	14.7	15.9
	13.1–18.2	*10.2–18.2*	*10.1–21.7*	*13.9–23.1*	*10.8–19.6*	*11.0–22.5*
Tertiary education	61.7	65.2	59.9	60.9	64.5	57.7
	56.6–66.5	*57.2–72.4*	*51.4–67.9*	*53.1–68.2*	*58.2–70.3*	*46.0–68.6*
Household income						
Low	31.3	27.4	29.6	35.0	29.1	35.7
	26.5–36.6	*19.5–37.0*	*23.5–36.5*	*27.6–43.3*	*22.7–36.6*	*26.7–45.9*
Medium	42.0	44.8	42.2	38.3	44.4	40.0
	38.1–46.0	*37.1–52.7*	*35.5–49.2*	*32.0–45.0*	*38.2–50.8*	*31.5–49.2*
High	26.7	27.8	28.2	26.7	26.5	24.2
	22.0–32.0	*21.0–35.9*	*19.6–38.7*	*20.2–34.3*	*20.6–33.3*	*16.0–35.0*
Residential location						
Major city	92.7	93.1	90.6	94.5	92.9	92.6
	85.7–96.5	*82.5–97.4*	*78.6–96.2*	*86.7–97.9*	*82.5–97.3*	*84.9–96.5*
Inner regional	7.1	6.9	9.0	5.5	7.1	7.1
	3.4–14.2	*2.6–17.5*	*3.5–21.3*	*2.1–13.3*	*2.7–17.5*	*3.2–14.8*
Outer regional	0.1	0.0	0.4	0.0	0.0	0.3
	0.0–0.6	—	*0.1–2.7*	—	—	*0.0–2.3*
Remote/Very remote	—	—	—	—	—	—
Reason for last dental visit						
Check-up	81.0	82.1	77.3	77.4	80.1	87.9
	76.7–84.6	*72.8–88.7*	*70.6–82.8*	*71.6–82.2*	*73.5–85.4*	*79.8–93.0*
Dental problem	19.0	17.9	22.7	22.6	19.9	12.1
	15.4–23.3	*11.3–27.2*	*17.2–29.4*	*17.8–28.4*	*14.6–26.5*	*7.0–20.2*

Row 1: Proportions were computed using weighted data.
Row 2: 95%CI: confidence intervals for estimates were computed using weighted data.
Columns are arranged by age at time of Survey.
— Cell estimates suppressed due to low number of children.

3.1.3 Characteristics of children in the South-East Queensland region

Table 3.3 presents the estimated percentage distribution of children aged 5–14 years who lived in the South-East Queensland region by sociodemographic characteristics.

In comparison to other regions of Queensland, the South-East region had a higher proportion of children living in low income households although the difference was not statistically significant.

Just over half (52.9%) of children in the South-East Queensland region were male. Within most age groups a similar pattern was observed.

Just over 4% of children were Indigenous with prevalence highest among children aged 7–8 years (6.8%).

Approximately four in ten (39.1%) of South-East Queensland children had a parent born overseas. Differences across age groups were minor.

Nearly one in two children (48.9%) had a parent with some tertiary level education and a further 22.3% of children had a parent with some vocational level training. Within age groups children aged 13–14 years were most likely to have parents with only school-level education (37.2%).

Only 16.9% of children in the South-East Queensland region lived in high income households and 39.4% lived in low income households. There was some variation in the household income distribution across age groups, but differences were not statistically significant.

Children in South-East Queensland resided mainly in a major city area (47.4%) and inner regional area (35.2%). Within age groups, between 12% and 18% of children lived in outer regional areas and less than 3% lived in remote/very remote locations. Variations in the distribution of residential location across age groups were not statistically significant.

Approximately one in four children (23.2%) visited for a dental problem at their last dental visit. Problem visiting was highest among children aged 7–10 years (approximately 26%) but differences across age groups were not statistically significant.

Table 3.3: Estimated percentages of children by selected characteristics – South-East Queensland

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
Sex						
Male	52.9	53.4	56.3	55.4	48.1	51.7
	50.3–55.6	*48.7–58.0*	*51.3–61.2*	*48.7–62.0*	*41.6–54.7*	*45.1–58.2*
Female	47.1	46.6	43.7	44.6	51.9	48.3
	44.4–49.7	*42.0–51.3*	*38.8–48.7*	*38.0–51.3*	*45.3–58.4*	*41.8–54.9*
Indigenous identity						
Non-Indigenous	95.9	97.7	93.2	95.5	96.3	96.8
	94.3–97.1	*94.6–99.0*	*88.6–96.0*	*91.9–97.5*	*93.3–98.0*	*94.2–98.3*
Indigenous	4.1	2.3	6.8	4.5	3.7	3.2
	2.9–5.7	*1.0–5.4*	*4.0–11.4*	*2.5–8.1*	*2.0–6.7*	*1.7–5.8*
Parent country of birth						
Australian born	60.9	62.8	62.2	59.2	59.7	60.4
	56.5–65.1	*55.2–69.9*	*54.4–69.4*	*52.9–65.2*	*53.5–65.7*	*51.3–68.9*
Overseas born	39.1	37.2	37.8	40.8	40.3	39.6
	34.9–43.5	*30.1–44.8*	*30.6–45.6*	*34.8–47.1*	*34.3–46.5*	*31.1–48.7*
Parental education						
School	28.8	23.4	28.7	25.7	29.0	37.2
	24.8–33.2	*18.2–29.5*	*22.2–36.3*	*20.2–32.0*	*23.4–35.3*	*30.9–43.9*
Vocational training	22.3	26.4	22.5	24.5	19.7	18.4
	19.6–25.3	*22.2–31.2*	*16.9–29.3*	*20.2–29.4*	*15.8–24.3*	*13.9–23.9*
Tertiary education	48.9	50.2	48.7	49.8	51.3	44.4
	43.7–54.1	*43.2–57.2*	*40.1–57.4*	*42.7–57.0*	*44.7–57.8*	*37.3–51.8*
Household income						
Low	39.4	36.7	38.6	43.6	38.3	40.0
	34.3–44.7	*29.7–44.3*	*31.1–46.6*	*36.0–51.6*	*32.2–44.8*	*33.2–47.1*
Medium	43.6	48.7	40.5	42.6	43.5	42.6
	40.2–47.1	*42.8–54.6*	*34.9–46.3*	*36.3–49.2*	*38.2–49.0*	*36.3–49.1*
High	16.9	14.6	20.9	13.7	18.2	17.5
	13.3–21.4	*10.2–20.6*	*15.8–27.2*	*9.8–19.0*	*13.1–24.7*	*12.4–24.0*
Residential location						
Major city	47.4	49.7	50.2	47.9	46.2	43.0
	38.8–56.1	*37.6–61.9*	*38.1–62.3*	*36.5–59.5*	*35.7–57.1*	*31.6–55.1*
Inner regional	35.2	35.5	32.9	33.2	35.4	39.0
	26.0–45.7	*24.2–48.8*	*21.4–46.8*	*22.4–46.0*	*24.8–47.6*	*27.4–52.0*
Outer regional	15.4	12.5	14.7	16.3	16.1	17.4
	9.0–25.2	*5.6–25.6*	*6.3–30.7*	*7.7–31.2*	*8.4–28.5*	*9.6–29.5*
Remote/Very remote	2.0	2.3	2.2	2.6	2.3	0.6
	0.3–12.2	*0.3–14.5*	*0.3–14.2*	*0.4–16.3*	*0.4–12.2*	*0.1–4.2*
Reason for Last Dental Visit						
Check-up	76.8	79.8	73.8	74.4	77.8	78.8
	74.0–79.4	*74.6–84.2*	*68.0–78.9*	*70.1–78.2*	*72.3–82.5*	*73.0–83.7*
Dental problem	23.2	20.2	26.2	25.6	22.2	21.2
	20.6–26.0	*15.8–25.4*	*21.1–32.0*	*21.8–29.9*	*17.5–27.7*	*16.3–27.0*

Row 1: Proportions were computed using weighted data.
Row 2: 95%CI: confidence intervals for estimates were computed using weighted data.
Columns are arranged by age at time of Survey.

3.1.4 Characteristics of children in the Northern Queensland region

Table 3.4 presents the estimated percentage distribution of children aged 5–14 years who lived in the Northern Queensland region by sociodemographic characteristics.

In comparison to other regions of Queensland, the Northern region had a higher proportion of Indigenous children, a lower proportion of children with a parent who was born overseas and a lower proportion of children with a parent who had some tertiary level education.

More than half (53.4%) of children in Northern Queensland were female. Within age groups females were more prevalent in all age groups except for children aged 9–10 years (46.5%).

Indigenous children represented 13.0% of the total child population with prevalence highest among children aged 5–6 years (16.4%). Although the proportion of children who were Indigenous varied across age groups, differences were not statistically significant.

Just over one-third of children (34.6%) from Northern Queensland had a parent who was born overseas. Variations across age groups were small and not statistically significant.

Nearly 44% of children had a parent with some tertiary education while one in three children (33.7%) had a parent with only school-level education. There was some variation in education level across age groups. The largest difference occurred among children aged 11–12 years where only 14.2% of children had a parent with some vocational level training compared to 22.7% across all ages.

Approximately one in five children (21.2%) lived in high income households and one in three children (33.0%) lived in low income households. The distribution of household income varied across age groups, particularly among children aged 7–8 years and 11–12 years.

In Northern Queensland, most children resided in outer regional areas (57.0%) or remote/very remote areas (41.5%). This pattern was consistent across all age groups.

Nearly three in four children (74.1%) visited for a check-up at their last dental visit and 25.9% visited for a dental problem. Problem visiting was more prevalent among children aged 7–10 years (approximately 28%) although differences across age groups were not statistically significant.

Table 3.4: Estimated percentages of children by selected characteristics – Northern Queensland

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
Sex						
Male	46.6	44.3	47.9	53.5	42.7	44.3
	41.4–51.8	*37.2–51.5*	*42.3–53.6*	*46.3–60.5*	*35.5–50.2*	*30.7–58.8*
Female	53.4	55.7	52.1	46.5	57.3	55.7
	48.2–58.6	*48.5–62.8*	*46.4–57.7*	*39.5–53.7*	*49.8–64.5*	*41.2–69.3*
Indigenous identity						
Non-Indigenous	87.0	83.6	90.5	88.7	85.1	86.9
	75.4–93.6	*68.0–92.5*	*79.0–96.0*	*76.6–95.0*	*70.0–93.4*	*76.3–93.2*
Indigenous	13.0	16.4	9.5	11.3	14.9	13.1
	6.4–24.6	*7.5–32.0*	*4.0–21.0*	*5.0–23.4*	*6.6–30.0*	*6.8–23.7*
Parent country of birth						
Australian born	65.4	66.2	64.2	63.8	64.4	68.5
	61.5–69.2	*56.6–74.7*	*56.9–71.0*	*55.3–71.5*	*57.9–70.3*	*60.3–75.7*
Overseas born	34.6	33.8	35.8	36.2	35.6	31.5
	30.8–38.5	*25.3–43.4*	*29.0–43.1*	*28.5–44.7*	*29.7–42.1*	*24.3–39.7*
Parental education						
School	33.7	35.0	33.9	28.6	36.8	34.3
	26.7–41.5	*24.9–46.5*	*23.7–45.9*	*20.5–38.3*	*28.4–46.0*	*26.1–43.5*
Vocational training	22.7	23.3	21.5	25.1	14.2	29.4
	19.3–26.6	*18.6–28.8*	*14.0–31.4*	*17.5–34.5*	*10.0–19.8*	*21.6–38.6*
Tertiary education	43.6	41.7	44.6	46.3	49.0	36.3
	36.5–50.9	*32.8–51.2*	*34.6–55.1*	*34.9–58.2*	*39.8–58.2*	*26.9–47.0*
Household income						
Low	33.0	32.4	28.4	32.9	36.5	34.9
	26.5–40.3	*22.8–43.8*	*20.2–38.3*	*24.8–42.1*	*27.6–46.5*	*26.5–44.3*
Medium	45.7	47.8	53.9	46.1	38.0	43.0
	40.9–50.7	*38.9–56.9*	*46.4–61.2*	*36.2–56.4*	*31.3–45.2*	*34.6–51.7*
High	21.2	19.7	17.7	21.0	25.4	22.2
	16.8–26.5	*12.7–29.3*	*12.1–25.3*	*13.8–30.6*	*19.3–32.7*	*14.3–32.7*
Residential location						
Major city	0.1	0.0	0.0	0.5	0.0	0.0
	0.0–0.7	—	—	*0.1–3.0*	—	—
Inner regional	1.5	2.6	0.7	0.0	1.1	3.2
	0.7–3.3	*0.9–7.4*	*0.1–4.5*	—	*0.3–4.2*	*0.9–10.0*
Outer regional	57.0	49.5	54.1	59.1	58.7	63.8
	41.9–70.9	*31.6–67.5*	*35.5–71.6*	*41.1–74.9*	*41.6–73.9*	*44.9–79.2*
Remote/Very remote	41.5	47.8	45.2	40.5	40.3	33.1
	27.6–56.9	*29.9–66.4*	*28.0–63.7*	*24.5–58.8*	*25.0–57.6*	*17.9–52.8*
Reason for last dental visit						
Check-up	74.1	72.8	71.8	71.1	76.8	77.7
	69.6–78.2	*62.8–80.9*	*63.0–79.1*	*63.6–77.6*	*70.6–82.1*	*67.8–85.2*
Dental problem	25.9	27.2	28.2	28.9	23.2	22.3
	21.8–30.4	*19.1–37.2*	*20.9–37.0*	*22.4–36.4*	*17.9–29.4*	*14.8–32.2*

Row 1: Proportions were computed using weighted data.
Row 2: 95%CI: confidence intervals for estimates were computed using weighted data.
Columns are arranged by age at time of Survey.
— Cell estimates suppressed due to low number of children.

3.1.5 Characteristics of children in the Townsville region

Table 3.5 presents the estimated percentage distribution of children aged 5–14 years who lived in the Townsville region by sociodemographic characteristics.

In comparison to other regions of Queensland, the Townsville region had a lower proportion of children with a parent who was born overseas and a lower proportion of children living in low income households.

Just over half (51.0%) of children in the Townville region were female. Variations in the distribution of sex across age groups were small.

Approximately 7% of children were Indigenous with prevalence consistent across age groups.

Three in ten children (30.6%) had a parent who was born overseas. There was some variation across age groups with prevalence lowest for children aged 7–8 years (25.5%) although differences were not statistically significant.

Just under half of children (47.2%) had a parent with some tertiary education and a further 22.2% had a parent with some vocational level training. There was some variation in the distribution of education by age group with a lower proportion of children aged 13–14 years having a parent with some tertiary education (40.4%).

Over one in two children (52.9%) in the Townsville region lived in medium level income households and a further 19.4% lived in high income households. There was some variation in income distribution across age groups, but no clear pattern emerged.

Close to 96% of children lived in an outer regional area and 2.9% lived in a remote/very remote location.

Three in four children (75.5%) made their last dental visit for the purpose of a check-up and one in four children visited for a dental problem. Problem visiting was less prevalent among children aged 13–14 years (17.9%).

Table 3.5: Estimated percentages of children by selected characteristics – Townsville

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
Sex						
Male	49.0	47.8	46.8	50.1	52.2	48.4
	46.4–51.7	*42.2–53.4*	*42.1–51.6*	*45.2–55.0*	*46.4–57.8*	*41.1–55.8*
Female	51.0	52.3	53.2	49.9	47.8	51.6
	48.4–53.6	*46.6–57.8*	*48.4–58.0*	*45.0–54.8*	*42.2–53.6*	*44.2–58.9*
Indigenous identity						
Non-Indigenous	92.9	92.9	92.9	93.3	92.6	92.8
	91.5–94.1	*89.7–95.2*	*90.1–95.0*	*90.4–95.4*	*89.0–95.1*	*88.1–95.8*
Indigenous	7.1	7.1	7.1	6.7	7.4	7.2
	5.9–8.5	*4.8–10.3*	*5.0–9.9*	*4.6–9.6*	*4.9–11.0*	*4.3–11.9*
Parent country of birth						
Australian born	69.4	67.9	74.5	68.9	66.7	69.2
	66.9–71.8	*62.4–73.0*	*70.1–78.4*	*64.1–73.4*	*61.1–71.9*	*61.8–75.6*
Overseas born	30.6	32.1	25.5	31.1	33.3	30.9
	28.2–33.1	*27.0–37.6*	*21.6–29.9*	*26.6–35.9*	*28.1–38.9*	*24.4–38.2*
Parental education						
School	30.6	30.5	28.5	32.1	30.6	31.3
	28.2–33.1	*25.4–36.0*	*24.3–33.1*	*27.6–37.0*	*25.5–36.2*	*24.9–38.6*
Vocational training	22.2	20.3	20.3	17.8	24.0	28.3
	20.0–24.6	*16.2–25.1*	*16.6–24.4*	*14.3–21.8*	*19.4–29.4*	*21.9–35.8*
Tertiary education	47.2	49.3	51.2	50.1	45.4	40.4
	44.6–49.8	*43.6–55.0*	*46.4–56.1*	*45.1–55.1*	*39.7–51.3*	*33.3–47.9*
Household income						
Low	27.7	30.9	25.6	26.2	31.6	24.2
	25.4–30.1	*25.8–36.5*	*21.6–30.1*	*22.0–30.9*	*26.3–37.3*	*18.4–31.1*
Medium	52.9	52.4	56.5	51.9	51.1	52.9
	50.3–55.6	*46.5–58.1*	*51.7–61.3*	*46.9–57.0*	*45.2–56.9*	*45.2–60.4*
High	19.4	16.8	17.8	21.9	17.4	22.9
	17.3–21.7	*12.8–21.6*	*14.4–21.9*	*17.9–26.4*	*13.4–22.2*	*16.9–30.3*
Residential location						
Major city	0.6	0.4	0.0	0.5	1.1	0.8
	0.3–1.2	*0.1–2.7*	—	*0.1–1.9*	*0.3–4.6*	*0.2–3.2*
Inner regional	0.4	0.2	0.7	0.5	0.4	0.0
	0.2–0.8	*0.0–1.7*	*0.2–2.9*	*0.1–2.0*	*0.1–2.6*	—
Outer regional	96.2	96.0	96.9	96.1	95.8	96.1
	95.1–97.1	*93.0–97.7*	*94.6–98.2*	*93.8–97.6*	*92.6–97.7*	*92.5–98.0*
Remote/Very remote	2.9	3.4	2.5	2.9	2.7	3.2
	2.2–3.9	*1.8–6.3*	*1.4–4.4*	*1.7–5.1*	*1.4–5.2*	*1.5–6.5*
Reason for last dental visit						
Check-up	75.5	71.5	74.6	71.2	75.6	82.1
	73.0–77.7	*64.6–77.6*	*70.0–78.8*	*66.4–75.6*	*70.2–80.4*	*75.9–87.0*
Dental problem	24.6	28.5	25.4	28.8	24.4	17.9
	22.3–27.0	*22.4–35.4*	*21.2–30.0*	*24.4–33.6*	*19.6–29.8*	*13.0–24.1*

Row 1: Proportions were computed using weighted data.
Row 2: 95%CI: confidence intervals for estimates were computed using weighted data.
Columns are arranged by age at time of Survey.
— Cell estimates suppressed due to low number of children.

3.2 Participation in the Survey

Response rates to QCOHS is analysed at two levels, firstly by analysing the participation of schools selected in the Survey, and secondly by analysing the participation of children sampled through the selected schools. A different sampling methodology was used to select the children in each zone and therefore the analysis is provided separately for Zone 1 and Zone 2.

3.2.1 Zone 1 – Queensland excluding Townsville region

School participation

There were 172 schools selected from a sampling frame of 1,310 schools in-scope of Zone 1. Selected schools consisted of 79 primary only schools, 66 secondary only schools and 27 combined primary/secondary schools.

Four schools selected from Bowen, Charters Towers, Ayr and Home Hill located near Townsville were subsequently excluded from the Survey as these towns would not be fluoridated until 2012 leaving 168 schools selected in Zone 1.

The number of schools that consented to participate in the Survey was 167. Of the original schools selected in Zone 1, 73 consented to participate in the Survey and 94 schools were replaced. Replacement schools were provided on a case-by-case basis to ensure that they were from the same region and same school type (Catholic/independent/state) as the original school selected. This strategy was possible for the majority of schools that were replaced.

Analysis of the original schools selected and the actual schools which participated in the Survey is provided by area health service region (Table 3.6), broad geographic region (Table 3.7) and school type (Table 3.8).

Table 3.6: School participation by area health service region in Zone 1

		Original schools		Actual schools	
Region	**Area health service**	**Number**	**Per cent**	**Number**	**Per cent**
Brisbane	Metro North	34	20.2	36	21.6
	Metro South	42	25.0	41	24.6
South-East	Sunshine Coast/Wide Bay	21	12.5	20	12.0
	Darling Downs/West Moreton	18	10.7	14	8.4
	Gold Coast	16	9.5	15	9.0
North	Cairns and Hinterland	13	7.7	14	8.4
	Mackay	9	5.4	11	6.6
	Mt Isa	2	1.2	2	1.2
	Central Queensland	13	7.7	14	8.4
Total		**168**	**100**	**167**	**100.0**

Table 3.7: School participation by broad region in Zone 1

	Original schools		Actual schools	
Region	**Number**	**Per cent**	**Number**	**Per cent**
Brisbane	76	45.2	77	46.1
South-East	55	32.7	49	29.3
North	37	22.0	41	24.6
Total	**168**	**100**	**167**	**100.0**

Table 3.8: School participation by school type in Zone 1

	Original schools		Actual schools	
School type	**Number**	**Per cent**	**Number**	**Per cent**
Catholic	34	20.2	33	19.8
Independent	19	11.3	17	10.2
State	115	68.5	117	70.1
Total	**168**	**100.0**	**167**	**100.0**

Child participation

There were 3,720 children examined in Zone 1. The number of children selected in each school was over-sampled to account for an estimated percentage of parents who would not consent to their child being examined. For primary schools, approximately 84 children were selected from each school with between 8–12 children selected per year level (Prep to Year 7). For secondary schools, approximately 36 children were selected from each school with approximately 12 children selected per year level. Only year levels 8 to 10 were included to minimise the number of children selected who were aged over 14 years.

The child participation rate, calculated as a percentage, is provided by area health service region (Table 3.9), broad geographic region (Table 3.10) and school type (Table 3.11). It is calculated as the number of children examined divided by the number of children selected for each region and school type. To derive child participation rates by region, children were assigned to a region based on the location of the school they attended.

The overall participation rate for children selected in Zone 1 was 32.7%. Participation rates varied across area health service regions with participation highest in Mackay (46.3%) and lowest in Mt Isa (28.1%). For the broad geographic regions, participation rates were similar ranging from 34.9% in the Northern region to 30.7% in Brisbane. Participation rates were also similar by school type with participation highest for children selected from Catholic schools (35.3%) and lowest for children selected from state schools (31.6%).

Table 3.9: Child participation by area health service region in Zone 1

Region	Area health service	Children examined	Child participation rate (per cent)
Brisbane	Metro North	748	31.5
	Metro South	853	30.0
South-East	Sunshine Coast/Wide Bay	516	36.3
	Darling Downs/West Moreton	322	32.5
	Gold Coast	325	32.3
North	Cairns and Hinterland	336	33.8
	Mackay	309	46.3
	Mt Isa	36	28.1
	Central Queensland	275	29.0
Total	**Total**	**3,720**	**32.7**

Table 3.10: Child participation by broad region in Zone 1

Region	Children examined	Child participation rate (per cent)
Brisbane	1,601	30.7
South-East	1,163	34.0
North	956	34.9
Total	**3,720**	**32.7**

Table 3.11: Child participation by school type in Zone 1

School Type	Children examined	Child participation rate (per cent)
Catholic	709	35.3
Independent	585	34.9
State	2,426	31.6
Total	**3,720**	**32.7**

3.2.2 Zone 2 – Townsville region

School participation

There were 46 schools eligible for selection from the Zone 2 sampling frame. These schools comprised 32 primary only schools, 9 secondary only schools and 5 combined primary/secondary schools. To ensure an adequate sample size for Zone 2, all of the 46 schools were approached and 37 agreed to participate in the Survey. Consenting schools consisted of 27 primary only schools, 7 secondary only schools and 3 combined primary/secondary schools.

Analysis of the original schools selected and the actual schools who consented to participate in the Survey is provided by school type in Table 3.12.

Table 3.12: School participation by school type in Zone 2

School Type	Selected	Participated
Catholic	10	9
Independent	6	2
State	30	26
Total	**46**	**37**

Child participation

There were 1,687 children examined in Zone 2. Initially, one in four children was randomly selected from year levels Prep to Year 10 in each participating school. The sampling fraction was subsequently increased to one in three children after examinations were completed for the first 10 schools to ensure an adequate sample size was achieved.

The overall participation rate for children selected in Zone 2 was 31.0% (Table 3.13). Participation rates were similar by school type with participation highest for children selected from independent schools (34.4%) and lowest for children selected from state schools (30.5%).

Table 3.13: Child participation by school type in Zone 2

School Type	Children examined	Child participation rate (per cent)
Catholic	415	31.8
Independent	74	34.4
State	1,198	30.5
Total	**1,687**	**31.0**

3.3 Assessment of non-participation bias

Despite the many advantages of studies based on a sample of individuals, surveys are not exempt of errors. Errors occur when the results obtained from the Survey data, which uses a sample of the population, are different from the results that would have been obtained if data were gathered from the total population (i.e. a census). These errors (or bias) may result when some segments of the population do not participate in a survey. Bias due to non-participation occurs when the participants differ from the non-participants or the target population in one or more characteristics. Nonetheless, low participation rates are not necessarily indicative of biased estimates, for example when participation is not systematically limited to a segment of the population in such instances, despite low participation the sample continues to appropriately represent the target population.

Several approaches can be taken to determine the potential for and extent of bias. For this Survey two approaches were adopted. The first approach was to examine participation rates at the small area level to determine whether participation in the Survey was correlated to an area's socioeconomic characteristics. The second approach was to compare the population estimates derived from the sample with the known sociodemographic characteristics.

3.3.1 Relationship between small area socioeconomic indicators and participation rates

To examine variation in participation rates at the small area level, children were assigned to a postcode based on the location of the school they were selected from. Participation at postcode level was defined as the number of children examined in a postcode divided by the number of children selected in the postcode. Participation ranged from 4.3% to 61.9% across Zone 1 and Zone 2 with a mean participation of 32.1% for Queensland. This variability in participation rates provided the opportunity to examine if characteristics of small geographic areas were associated with participation in the Survey. The Australian Bureau of Statistics (ABS) socioeconomic indices for areas (SEIFA), defined at the postcode level, was used to examine if Survey participation rates differed systematically between disadvantaged and advantaged postcodes.

This analysis focused on the Index of Relative Socio-economic Advantage and Disadvantage (IRSAD). The IRSAD is a continuum in which lower values indicate more disadvantaged areas (areas with a relatively higher proportion of people with low income and more people with unskilled occupations) and higher values indicate more advantaged areas (areas with a relatively high proportion of people with high income and skilled occupations). For this analysis, the IRSAD were assigned to the postcode of each school's location.

Figure 3.1 presents the correlation between participation rates at the postcode level and the corresponding Index of Relative Socio-economic Advantage and Disadvantage score (ABS 2011).

The ABS 2011 SEIFA IRSAD values for Queensland postcodes ranged between 589 and 1,147 with only 6 of 419 postcodes having a score below 800 (1.4%). The IRSAD values for postcodes where children were selected from ranged between 788 and 1,147 with 2 of 114 postcodes (1.8%) having an IRSAD score below 800.

Participation rates are similarly distributed across the range of IRSAD scores with data points randomly dispersed indicating no significant relationship between IRSAD score and postcode participation rate. Likewise, the proximity of the correlation coefficient to zero (-0.05) and its associated p-value (0.59) indicate no correlation between participation in the Survey and level of socioeconomic advantage/disadvantage of areas.

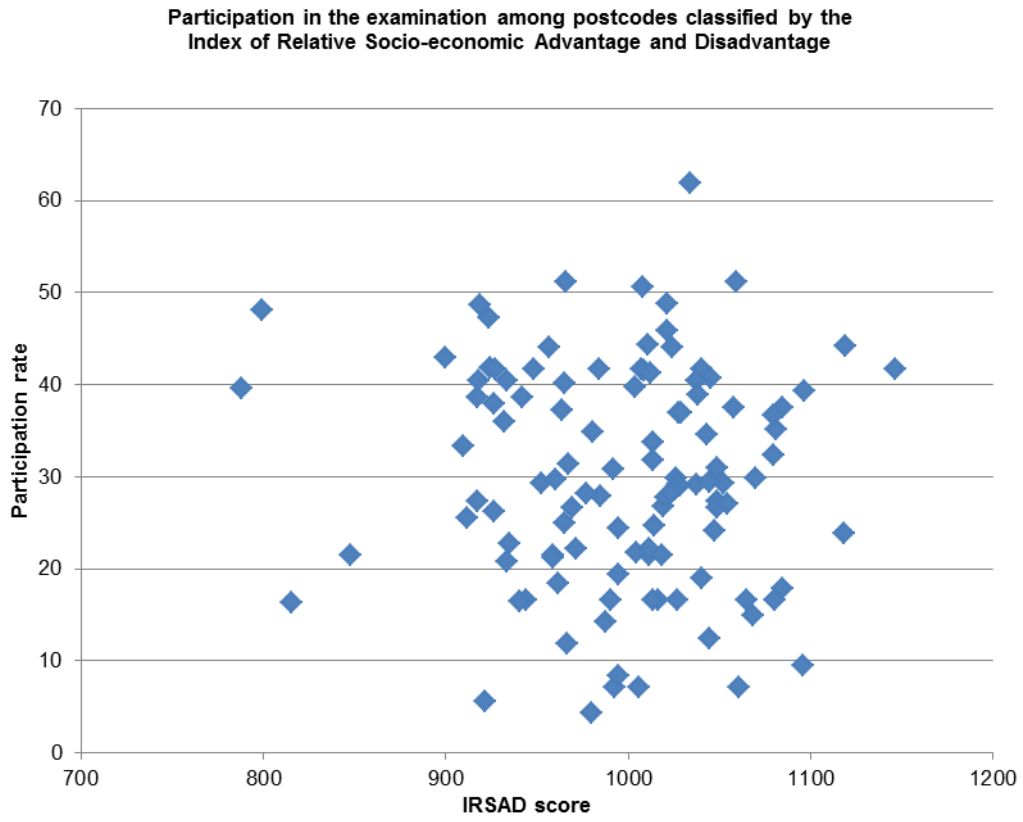


Figure 3.1: Participation rates among postcodes by the Index of Relative Socio-economic Advantage and Disadvantage

3.3.2 Comparison with population benchmarks

To investigate the potential for bias due to the variation in participation rates among demographic groups in the sample, the population estimates derived from the Survey were compared to the known distribution of selected demographics for the Queensland child population aged 5–14 years.

Census figures were obtained from the Australian Bureau of Statistics (ABS) online Table Builder tool and customised tables from the ABS Information Consultancy Service. Population counts of children aged 5–14 years were obtained from the 2011 Census and are based on place of usual residence. Table 3.14 compares the estimated percentage distribution of children aged 5–14 years derived from weighted Survey data with the Census benchmarks for a range of sociodemographic characteristics. Comparisons by age are not included in Table 3.14 because age was used to calculate the Survey weights and hence any differences in participation by age have already been accounted for.

The primary focus of Table 3.14 is to compare differences in the Census distribution with the distribution derived from the Survey for each sociodemographic characteristic. There is potential for bias if the Census figure within any row lies outside the 95% confidence interval (CI) for the population estimate derived from the Survey within the same row. The rationale was that if one demographic group was more likely to be excluded from the Survey than another, the Survey's estimated percentage of children, who are in that group, would differ from the Census percentage.

The estimated percentage of Queensland children aged 5–14 years who were male (51.3%) was identical to the Census figure. For Indigenous identity, the Survey estimated 5.2% of children were Indigenous compared to the Census figure of 6.9%.

With respect to parental characteristics, the estimated percentage of children with an overseas born parent (41.3%) was higher than the Census figure (32.8%). This difference may be partially explained by the larger level of non-response to this question in the Census (6%). The estimated percentage of children with an Indigenous parent (4.3%) was slightly lower than the Census figure (5.8%). For labour force status, the Survey estimated that 90.3% of children had at least one parent who was employed either full-time or part-time which was higher than the Census figure (84.6%).

For household characteristics, the estimated percentage of children living in one-parent households (17.6%) was lower than the Census figure (22.3%). With respect to household income, the Survey estimated a lower percentage of children living in high income households (20.7%) than the Census (27.3%). Consequently, the Survey estimated a higher percentage of children living in low income households (35.3% compared to 32.5%) and medium income households (44.0% to 40.3%).

With respect to residential location, the percentage of children living in a major city area (50.5%) was lower than the Census figure (59.4%). Conversely, the Survey overestimated the percentage of children living in outer regional areas (22.1% compared with 15.7%) and remote/very remote areas (8.1% compared with 3.4%).

These results indicate there is potential for bias in the study sample with regard to some population benchmarks and therefore there is a need to investigate the potential impact of this bias on the main outcome variables relating to children's oral health.

Table 3.14: Population benchmark comparison of demographic characteristics – Queensland

	Survey estimate		2011 Census
	% of children	(95%CI)	% of children
Child's demographic characteristics			
Child sex			
Male	51.3	(49.4–53.3)	51.3
Female	48.7	(46.7–50.6)	48.7
Child Indigenous identity			
Non-Indigenous	94.8	(92.8–96.2)	93.1
Indigenous	5.2	(3.8–7.2)	6.9
Parent/guardian demographic characteristics			
Parent country of birth			
Australian born	**58.7**	**(56.1–61.3)**	**67.2**
Overseas born[1]	**41.3**	**(38.7–43.9)**	**32.8**
Parent Indigenous identity			
Non-Indigenous	95.5	(93.5–97.0)	94.2
Indigenous[2]	4.3	(3.1–6.5)	5.8
Parent labour force status			
Employed[3]	**90.3**	**(88.1–92.1)**	**84.6**
Unemployed	**9.7**	**(7.9–11.9)**	**15.4**
Household demographic characteristics			
Type of household			
One parent	**17.6**	**(15.8–19.6)**	**22.3**
Two parent household	**82.4**	**(80.4–84.2)**	**77.7**
Household income			
Low	35.3	(32.2–38.5)	32.5
Medium	**44.0**	**(41.8–46.2)**	**40.3**
High	**20.7**	**(18.2–23.4)**	**27.3**
Residential location (child)			
Major city	**50.5**	**(45.3–55.7)**	**59.4**
Inner regional	19.2	(14.5–25.1)	21.6
Outer regional	**22.1**	**(17.7–27.4)**	**15.7**
Remote/Very remote	**8.1**	**(5.3–12.4)**	**3.4**

1 Children were classified to the overseas born category if they had at least one parent who was born overseas.
2 Children were classified to the Indigenous category if they had at least one parent who was Indigenous.
3 Children were classified to the employed category if they had at least one parent who was employed.

3.3.3 Direct standardisation using population benchmarks

The previous analysis indicated the sample may be biased with respect to the demographic characteristics, parental country of birth, parental labour force status, type of household, household income, and residential location. With these characteristics the 95% confidence interval for the Survey estimate did not include the corresponding Census figure. To investigate the potential impact of this bias on estimates relating to the oral health of children a statistical method called direct standardisation was used. This method involves the calculation of oral health estimates by adjusting the Survey distribution of a demographic characteristic to be the same as the corresponding Census distribution.

For example, the Survey underestimated the percentage of children with parent(s) who are unemployed and hence the adjustment would inflate the representation of this group so that it became equivalent to the Census distribution. The difference between the adjusted oral health estimate and the observed Survey estimate provides a measure of the degree of bias due to variations in participation. For this analysis, SUDAAN statistical software was used to perform direct standardisation by specifying the Census distribution for each demographic variable in the standard weight (stdwgt) statement.

Table 3.15 compares the observed estimates derived from the Survey with the adjusted estimates for seven important oral health indicators. The standardisation is performed separately for the parental characteristics, country of birth and labour force status.

The difference between the observed and adjusted Survey estimates was small for all oral health indicators examined. For standardisation by parent country of birth, the largest absolute difference occurred for the per cent of children with dmft>0, where the adjusted Survey estimate was 0.3 percentage points lower than the observed estimate. Standardising by parent labour force status yielded a slight increase in dental disease with average dmfs increasing from 4.1 to 4.3 and the percentage of children with primary or permanent caries increasing by 0.5 percentage points. All variations between the observed estimate and corresponding standardised estimate were not statistically significant.

Table 3.15: Observed and adjusted estimates of oral health indicators standardised to 2011 Census benchmarks for parent/guardian demographic characteristics

		Estimate and 95%CI adjusted for:	
Oral health indicator	**Observed estimate**	**Parent country of birth**	**Parent labour force status**
% children with dmft>0	49.5 (46.9–52.0)	49.2 (46.7–51.8)	50.0 (47.5–52.5)
% children with DMFT>0	29.5 (27.2–31.8)	29.4 (27.1–31.8)	30.0 (27.7–32.4)
% children with good or excellent oral health	55.1 (52.9–57.2)	55.1 (52.9–57.3)	54.5 (52.4–56.6)
Average number of dmft	2.0 (1.8–2.2)	2.0 (1.8–2.1)	2.1 (1.9–2.2)
Average number of dmfs	4.1 (3.7–4.6)	4.1 (3.7–4.5)	4.3 (3.9–4.7)
Average number of DMFT	0.7 (0.6–0.8)	0.7 (0.6–0.8)	0.7 (0.7–0.8)
Average number of DMFS	1.0 (0.9–1.1)	1.0 (0.9–1.1)	1.0 (0.9–1.1)

Table 3.16 compares the observed estimates derived from the Survey with the adjusted estimates standardised by the household characteristics, type of household, household income and residential location.

The difference between the observed and adjusted Survey estimates was small for all oral health indicators examined. For type of household, standardisation yielded a slight increase in dental disease with the average dmfs increasing from 4.1 to 4.3 and the per cent of children with dmft>0 increasing from 49.5% to 50.0%. In contrast, standardising by household income yielded a decrease in dental disease with average dmft and average DMFS decreasing by 0.1 and the per cent of children with dmft>0 decreasing from 49.5% to 48.0%. Likewise, for residential location, there was a slight reduction in dental disease with per cent of children with dmft>0 decreasing from 49.5% to 48.8%. All variations between the observed estimate and corresponding standardised estimate were not statistically significant.

In summary, standardising by these parental and household characteristics had little impact on the measures of children's oral health indicating that the bias due to differential response rates across sociodemographic groups was negligible.

Table 3.16: Observed and adjusted estimates of oral health indicators standardised to 2011 Census benchmarks for household demographic characteristics

		Estimate and 95%CI adjusted for:		
Oral health indicator	**Observed estimate**	**Type of household**	**Household income**	**Residential location**
% children with dmft>0	49.5 (46.9–52.0)	50.0 (47.5–52.4)	48.0 (45.8–50.3)	48.8 (46.2–51.4)
% children with DMFT>0	29.5 (27.2–31.8)	29.7 (27.4–32.0)	28.7 (26.5–30.9)	29.5 (27.1–32.0)
% children with good or excellent oral health	55.1 (52.9–57.2)	54.6 (52.5–56.7)	56.5 (54.6–58.4)	55.5 (53.3-57.7)
Average number of dmft	2.0 (1.8–2.2)	2.0 (1.9–2.2)	1.9 (1.8–2.1)	2.0 (1.8–2.1)
Average number of dmfs	4.1 (3.7–4.6)	4.3 (3.9–4.7)	4.0 (3.7–4.3)	4.1 (3. 7–4.6)
Average number of DMFT	0.7 (0.6–0.8)	0.7 (0.7–0.8)	0.7 (0.6–0.8)	0.7 (0.6–0.8)
Average number of DMFS	1.0 (0.9–1.1)	1.0 (0.9–1.1)	0.9 (0.8–1.1)	1.0 (0.9–1.1)

3.4 Summary of findings

Chapter 3 presents sociodemographic and region-specific characteristics of the sample and then uses several approaches to evaluate the potential for bias including area-level socioeconomic factors in relation to participation rates and comparison of the sample estimates to the child population as characterised by the 2011 Census, as well as methods of direct standardisation of Survey estimates to Census data.

The sociodemographic characteristics of the study population were described for Queensland overall. Region specific and sociodemographic characteristics of the Survey population were identified for four regions: Brisbane, South-East Queensland, Northern Queensland and Townsville.

The data for Queensland indicated a similar proportion of girls and boys and the majority of children were non-Indigenous. Just over two in five children had a parent born overseas and over one in two children had a parent with some tertiary education. Children were more likely to live in medium income households (44.0%) than in low (35.3%) or high (20.7%) income households.

Compared to the general Queensland child population, the Brisbane region was characterised by a low proportion of children of Indigenous origin whereas a higher proportion was present in the Northern Queensland region. A reversed pattern was observed regarding children with a parent born overseas and children with at least one parent with some tertiary education (high proportion in the Brisbane region and low proportion in the Northern Queensland region). Income in the Brisbane region was generally higher than in other regions and lower in the South-East region compared to the overall Queensland results.

A further break-down by age groups revealed that most of the differences in estimates across age groups may be attributed to sampling variability.

As in all studies that are limited to a sample of the population (as opposed to a population Census), there exists the possibility of bias in the Survey estimates. We employed various methods to investigate the potential that bias might be present. Firstly, response rates were examined by area-level socioeconomic indicators. The correlation between participation rates at the level of school postcodes and SEIFA IRSAD scores (ABS 2011) for the corresponding geographic areas indicated that response rates were similarly distributed across the range of IRSAD scores and the data points on the graph were dispersed indicating no significant relationship between IRSAD and postcode response rates.

Secondly, key characteristics of the sample were compared to Census population benchmarks. The results from the total Queensland population differed slightly from QCOHS estimates regarding parent country of birth, labour force status, type of household, household income and residential location. Therefore, QCOHS estimates of oral health were standardised to reflect the Census distributions of the characteristics in question. Differences between observed estimates and adjusted estimates were small after standardisation of sample estimates to the Census distribution of the variables. All variations between the observed estimate and corresponding estimate were not statistically significant. In summary, standardising by these parental and household characteristics had little impact on the measures of children's oral health indicating that the bias due to differential response rates across sociodemographic groups was negligible.

4. Oral health status

By Diep Ha, Kaye F Roberts-Thomson and Loc Do

4.1 Experience of dental caries

Dental caries develops as a result of a complex interaction over time between acid-producing bacteria (in dental plaque) and fermentable carbohydrates (sugars and other carbohydrates from food and drink that can be fermented by bacteria), as well as many host factors including tooth anatomy and structure and saliva. Dental caries is characterised by the loss of mineral ions from the tooth (demineralisation), stimulated largely by the presence of bacteria and their acid by-products. Re-mineralisation occurs when partly dissolved enamel crystals are induced to grow by the re-depositing of minerals via saliva. The demineralisation of the tooth surface can be limited and re-mineralisation encouraged by the use of fluorides. Normally, a balance occurs between the demineralisation and remineralisation of the tooth surface (enamel). However, this balance is disturbed under some conditions, and chronic demineralisation leads to the formation of holes or cavities in the tooth enamel surface. In its early stages the damage can be reversed with the use of fluoride. Cavitation (a hole in a tooth) beyond the outer enamel covering of the tooth into the deeper tissues of the tooth (dentine) can lead to a bacterial infection, which may cause considerable pain and require restorative treatment (filling) or the removal of the tooth. Once the cavity has formed, a filling is needed to restore the form and function of the tooth.

At about the age of 5 or 6 years, children commence losing their primary ('baby') teeth, which are replaced by their permanent teeth. Most children have lost all their primary teeth and have gained their permanent teeth (with the exception of wisdom teeth, which may erupt several years, or even decades, later) by the age of 12 years. Therefore, analyses of dental caries in teenage children only report the level of disease in permanent teeth. Younger children generally have a mixture of deciduous and permanent teeth, from ages 5 to 12 years. The convention is to report on these two dentitions separately.

4.1.1 Primary dentition

Primary teeth, otherwise known as milk teeth, baby teeth or deciduous teeth, are the first set of teeth. The first set of teeth are shed and replaced by permanent teeth. The first primary tooth erupts at about 6 months of age and the twentieth and last primary tooth erupts at around 2½ years of age. The primary teeth are replaced, beginning usually at about age 6. This section reports caries experience in the primary dentition among children aged 5 to 10 years. For children aged 11 years or older, caries experience in the primary dentition is not reported. Natural exfoliation of primary teeth means that dmf scores can be less sensitive after age of 10 years.

Prevalence of untreated decay

The prevalence of untreated decay in the primary dentition is reported in Table 4.1 as the percentage of children who have one or more decayed surfaces on their primary teeth. Untreated decay reflects both the prevalence of dental caries in the primary dentition in the younger age group (5–10 years) population and unmet need for treatment.

The prevalence of untreated decay in the Queensland child population was 30.0%; that is almost one in every three children aged 5–10 years had at least one primary tooth with untreated decay. The prevalence did not vary among age groups.

Among children of all ages, children whose last dental visit was for a problem had the highest percentage with untreated decay (49.0%), whereas children from high income households had the lowest (19.3%). Other differences were seen relating to Indigenous identity and parental education.

The prevalence of untreated decay among children whose last visit was for a problem was 2.0 times that of children whose last dental visit was for a check-up (49.0% compared with 24.0%) in children of all ages. In children aged 5–6 years a 3.0-fold difference in prevalence of untreated decay was seen between children whose last visit was for a problem (62.0%) and children whose last visit was for a check-up (21.0%). A 2.0-fold relative difference in prevalence was seen between the two groups among children aged 7–8 years (49.9% compared with 24.5%) and a 1.6-fold relative difference in children aged 9–10 years between those whose last visit was a for problem (40.5%) and those whose last visit was for a check-up (25.8%).

The prevalence of untreated decay varied between groups by Indigenous identity. There was a 1.7-fold difference between Indigenous (48.0%) and non-Indigenous children (28.4%) among all ages. There was a 2.1-fold relative difference in the prevalence of untreated decay between Indigenous (58.4%) and non-Indigenous children (27.3%) in children aged 5–6 years and a 2.0-fold relative difference in children aged 7–8 years (55.8% compared with 28.6%).

Untreated decay in children from low income households (36.9%) was 1.3 times more prevalent than children from medium income households (27.7%) and 1.9 times higher than those from high income households (19.3%). The biggest relative difference among this population group was found among low income and high income household children aged 5–6 years (42.8% compared with 18.7%). A 2.0-fold relative difference in prevalence was seen between the two groups among children aged 7–8 years (37.1% compared with 18.9%) and a 1.5-fold relative difference in children aged 9–10 years between those from low income households (31.6%) and those from high income households (20.5%). There was 1.4 times relative difference in untreated decay prevalence among children of parents with only school-level education (38.4%) and children of parents with some tertiary education (26.6%).

In summary, children from disadvantaged backgrounds including Indigenous identity, whose parents had less education or came from low income households had a higher prevalence of untreated decay in their primary teeth, as did children whose last dental visit was for a problem. The differences were bigger among younger age groups.

Table 4.1: Percentage of children with untreated decayed teeth in the primary dentition in the Queensland child population

		Population: children aged 5–10 years		
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**
All	**30.0**	**29.4**	**31.0**	**29.6**
	27.5–32.6	*25.5–33.7*	*27.1–35.2*	*27.0–32.3*
Sex				
Male	30.7	30.0	32.3	29.8
	27.7–33.8	*25.3–35.0*	*27.1–37.9*	*26.3–33.5*
Female	29.3	28.9	29.6	29.4
	26.1–32.7	*24.0–34.4*	*24.7–34.9*	*24.9–34.3*
Indigenous identity				
Non-Indigenous	28.4	27.3	28.6	29.4
	26.1–30.8	*23.4–31.5*	*24.9–32.6*	*26.7–32.2*
Indigenous	48.0	58.4	55.8	32.3
	38.2–57.8	*44.1–71.3*	*40.1–70.4*	*24.5–41.0*
Parent country of birth				
Australian born	28.7	27.4	30.2	28.6
	25.7–31.9	*22.9–32.3*	*25.4–35.4*	*25.0–32.4*
Overseas born	31.9	32.5	32.3	31.1
	28.5–35.5	*26.8–38.7*	*27.1–37.9*	*26.7–35.7*
Parental education				
School	38.4	40.7	41.2	33.1
	33.6–43.5	*32.4–49.5*	*33.9–48.9*	*27.1–39.7*
Vocational training	26.4	26.7	29.0	23.9
	22.3–30.9	*19.5–35.3*	*22.2–36.9*	*18.5–30.3*
Tertiary education	26.6	24.4	25.3	30.0
	23.7–29.6	*19.8–29.7*	*20.9–30.3*	*26.1–34.1*
Household Income				
Low	36.9	42.8	37.1	31.6
	33.5–40.4	*37.0–48.8*	*30.8–43.8*	*26.5–37.1*
Medium	27.7	22.7	30.0	31.0
	24.8–30.7	*18.5–27.6*	*24.9–35.6*	*26.8–35.5*
High	19.3	18.7	18.9	20.5
	15.2–24.2	*12.3–27.4*	*12.2–28.2*	*15.1–27.0*
Residential location				
Major city	29.2	30.1	29.6	27.7
	25.7–32.8	*24.5–36.4*	*24.5–35.3*	*23.8–31.8*
Inner regional	29.6	26.0	31.4	31.9
	25.9–33.6	*18.8–34.8*	*24.5–39.2*	*25.8–38.7*
Outer regional	28.4	26.3	28.8	29.8
	24.0–33.1	*21.3–31.9*	*21.1–37.8*	*24.5–35.7*
Remote/Very remote	38.4	39.6	40.8	34.6
	27.4–50.7	*24.9–56.5*	*25.5–58.1*	*27.4–42.5*
Reason for last dental visit				
Check-up	24.0	21.0	24.5	25.8
	21.6–26.5	*17.1–25.4*	*20.2–29.5*	*22.8–28.9*
Dental problem	49.0	62.0	49.9	40.5
	44.4–53.5	*51.5–71.4*	*42.3–57.5*	*34.0–47.3*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Number of untreated decayed primary teeth per child

The following table (Table 4.2) shows the average numbers of untreated decayed primary teeth per child in children aged 5–10 years. Among all children, there was a difference between children aged 5–6 years (1.1 teeth) and children aged 9–10 years (0.6 teeth). The highest average number of decayed teeth among children of all ages was found among Indigenous children (1.6 teeth) and children who last visited for a dental problem (1.5 teeth) and the lowest among children from households with a high income (0.5 teeth).

For all ages, Indigenous children had twice the average number of decayed teeth than non-Indigenous children (1.6 compared with 0.8 teeth). Further, among children aged 7–8 years there was a relative difference of 2.4-fold with Indigenous children having 1.7 and non-Indigenous children with 0.7 decayed teeth.

Children of parents whose highest level of education was school-level, had nearly twice the average number of decayed primary teeth than those whose parents had some tertiary education (1.3 compared with 0.7 teeth). Among children aged 5–6 years the relative difference was 2.3-fold (1.8 compared with 0.8 teeth), and among children aged 7–8 years the difference was 2.2-fold (1.3 compared with 0.6 teeth).

Household income was associated with differences in the number of decayed primary teeth with children from low income households having 1.6 times more decayed primary teeth (1.1 teeth) relative to medium income households (0.7 teeth) and 2.2 times more than children from high income households (0.5 teeth). These differences also were seen in children aged 5–6 years where there was a 2.4-fold relative difference between low income household children (1.7 teeth) and medium income household children (0.7 teeth) and a 2.8-fold relative difference between low income household children (1.7 teeth) and high income household children (0.6 teeth). In the older age groups the differences were seen between children from the low and high income households with a 2.0-fold difference in children aged 7–8 years (1.0 compared with 0.5 teeth) and a 2.3-fold relative difference in children aged 9–10 years (0.7 compared with 0.3 teeth).

Children who last made a dental visit for a problem had higher numbers of decayed primary teeth than children who visited for a check-up. The relative difference between children who last visited for a problem and those who last visited for a check-up was 3.0-fold among all children (1.5 compared with 0.5 teeth), and 5.0-fold among children aged 5–6 years. The relative difference was also higher for children aged 7–8 years (1.5 compared with 0.6 teeth) and for children aged 9–10 years.

In summary, differences in the average number of untreated decayed primary teeth were seen by age, Indigenous identity, parental education, household income and reason for last dental visit.

Table 4.2: Number of untreated decayed teeth per child of the primary dentition in the Queensland child population

		Population: children aged 5–10 years		
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**
All	**0.8**	**1.1**	**0.8**	**0.6**
	0.7–1.0	*0.8–1.3*	*0.6–1.0*	*0.5–0.7*
Male	0.8	1.0	0.8	0.6
	0.7–1.0	*0.8–1.3*	*0.7–1.0*	*0.5–0.8*
Female	0.8	1.1	0.8	0.6
	0.7–1.0	*0.8–1.4*	*0.6–1.0*	*0.4–0.7*
Indigenous identity				
Non-Indigenous	0.8	1.0	0.7	0.6
	0.7–0.9	*0.8–1.2*	*0.6–0.9*	*0.5–0.7*
Indigenous	1.6	2.2	1.7	1.0
	0.9–2.2	*1.0–3.3*	*1.1–2.3*	*0.5–1.5*
Parent country of birth				
Australian born	0.7	0.9	0.7	0.6
	0.6–0.8	*0.6–1.1*	*0.5–0.9*	*0.5–0.7*
Overseas born	1.0	1.3	1.0	0.7
	0.8–1.2	*1.0–1.7*	*0.7–1.2*	*0.5–0.8*
Parental education				
School	1.3	1.8	1.3	0.7
	1.0–1.5	*1.2–2.4*	*0.9–1.6*	*0.5–0.9*
Vocational training	0.6	0.7	0.5	0.5
	0.4–0.7	*0.5–1.0*	*0.4–0.6*	*0.3–0.6*
Tertiary education	0.7	0.8	0.6	0.6
	0.5–0.8	*0.5–1.0*	*0.4–0.9*	*0.5–0.7*
Household income				
Low	1.1	1.7	1.0	0.7
	0.9–1.3	*1.3–2.1*	*0.7–1.2*	*0.6–0.9*
Medium	0.7	0.7	0.7	0.6
	0.5–0.8	*0.4–0.9*	*0.5–1.0*	*0.5–0.7*
High	0.5	0.6	0.5	0.3
	0.3–0.6	*0.3–0.9*	*0.2–0.7*	*0.2–0.4*
Residential location				
Major city	0.8	1.1	0.8	0.6
	0.7–1.0	*0.8–1.3*	*0.6–1.1*	*0.4–0.7*
Inner regional	0.7	0.7	0.6	0.7
	0.6–0.8	*0.5–1.0*	*0.4–0.8*	*0.5–0.9*
Outer regional	0.7	1.0	0.7	0.5
	0.6–0.9	*0.6–1.5*	*0.5–0.9*	*0.4–0.7*
Remote/Very remote	1.2	1.7	1.1	0.9
	0.5–1.9	*0.7–2.7*	*0.4–1.7*	*0.5–1.2*
Reason for last dental visit				
Check-up	0.5	0.5	0.6	0.5
	0.4–0.6	*0.4–0.7*	*0.4–0.7*	*0.4–0.5*
Dental problem	1.5	2.5	1.5	1.0
	1.3–1.8	*1.8–3.2*	*1.1–1.9*	*0.8–1.2*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Number of untreated decayed primary tooth surfaces per child

The number of decayed tooth surfaces per child reflects the burden of untreated disease. In this Survey all teeth were divided into five coronal surfaces and each was assessed for untreated decay, defined as a cavity that had broken through enamel or visibly undermined it. Higher average numbers of decayed surfaces reflect both experience of dental caries and lack of dental treatment.

Among all children the average number of decayed primary tooth surfaces was 1.5 (Table 4.3) with the highest number among the youngest age group (1.9 surfaces) and lowest among children aged 9–10 years (1.1 surfaces). Among all children the lowest number was seen in children whose household income was high (0.7 surfaces) and highest among Indigenous children (3.1 surfaces). There were differences according to Indigenous identity, parental education, household income and reason for last dental visit.

Children aged 7–8 years who identified as Indigenous had 2.7 times more untreated decayed surfaces (3.2 surfaces) than other Queensland children (1.2 surfaces). The greatest absolute difference was seen in the youngest age group who last visited for a problem (4.7 surfaces) compared with children whose last visit was for a check-up (0.8 surfaces). The second greatest absolute difference was seen in the youngest Indigenous children (4.3 surfaces) compared with their non-Indigenous counterparts (1.8 surfaces), however, caution must be used when interpreting results for this age group as the 95%CI for the estimate is wider among Indigenous children than among non-Indigenous children.

Children whose parents' highest level of education was school-level, had higher numbers of decayed primary tooth surfaces (2.4 surfaces) than children of parents with some vocational training (0.9 surfaces) or some tertiary education (1.1 surfaces). Among children aged 7–8 years those whose parents had less education had 2.4 times the number of decayed primary surfaces (2.4 surfaces) relative to children of tertiary educated parents (1.0 surface) and 3.0 times that of children whose parents had some vocational training (0.8 surfaces).

Children in households with a low income had higher average numbers of decayed surfaces across the age groups relative to children in high income households. The relative differences were 3-fold among all children (2.1 compared with 0.7 surfaces), 2.6-fold among children aged 7–8 years (1.8 compared with 0.7 surfaces) and 2.8-fold among children aged 9–10 years (1.4 compared with 0.5 surfaces).

Children whose last dental visit was for a problem had higher average numbers of decayed primary tooth surfaces than children who last attended for a check-up. Children of all ages who last attended for a problem had 3.6 times more decayed surfaces (2.9 surfaces) than those who last visited for a check-up (0.8 surfaces). The relative difference was greatest among the youngest children (5.9-fold) (4.7 compared with 0.8 surfaces), compared with a 3.5-fold difference among children aged 7–8 years (2.8 compared with 0.8 surfaces) and a 2.3-fold relative difference among children aged 9–10 years (1.8 versus 0.8 surfaces).

In summary, differences in the average number of untreated decayed primary tooth surfaces were associated with age, Indigenous identity, parental education, household income and reason for last dental visit.

Table 4.3: Number of untreated decayed tooth surfaces of the primary dentition in the Queensland child population

	Population: children aged 5–10 years			
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**
All	**1.5**	**1.9**	**1.4**	**1.1**
	1.2–1.8	*1.4–2.4*	*1.0–1.7*	*0.8–1.3*
Sex				
Male	1.5	1.8	1.4	1.2
	1.1–1.8	*1.3–2.4*	*1.0–1.8*	*0.9–1.5*
Female	1.5	2.0	1.4	0.9
	1.1–1.9	*1.3–2.8*	*0.9–1.8*	*0.6–1.2*
Indigenous identity				
Non-Indigenous	1.3	1.8	1.2	1.0
	1.1–1.5	*1.3–2.2*	*0.9–1.5*	*0.8–1.1*
Indigenous	3.1	4.3	3.2	2.2
	1.5–4.8	*1.1–7.4*	*1.8–4.6*	*0.8–3.6*
Parent country of birth				
Australian born	1.2	1.5	1.1	1.0
	0.9–1.5	*1.0–2.1*	*0.8–1.4*	*0.7–1.3*
Overseas born	1.8	2.5	1.7	1.2
	1.4–2.2	*1.7–3.3*	*1.1–2.3*	*0.9–1.5*
Parental education				
School	2.4	3.6	2.4	1.3
	1.7–3.1	*2.2–5.0*	*1.6–3.2*	*0.8–1.8*
Vocational training	0.9	1.3	0.8	0.8
	0.7–1.2	*0.7–1.9*	*0.5–1.0*	*0.4–1.2*
Tertiary Education	1.1	1.3	1.0	1.0
	0.9–1.3	*0.9–1.7*	*0.6–1.4*	*0.7–1.2*
Household income				
Low	2.1	3.3	1.8	1.4
	1.7–2.6	*2.3–4.3*	*1.3–2.3*	*0.9–1.8*
Medium	1.1	1.2	1.1	0.9
	0.8–1.3	*0.7–1.6*	*0.7–1.5*	*0.7–1.1*
High	0.7	0.9	0.7	0.5
	0.5–0.9	*0.4–1.4*	*0.3–1.2*	*0.3–0.6*
Residential location				
Major city	1.5	2.0	1.5	1.0
	1.1–1.9	*1.3–2.6*	*0.9–2.0*	*0.7–1.3*
Inner regional	1.2	1.2	1.0	1.2
	0.9–1.5	*0.8–1.7*	*0.6–1.4*	*0.8–1.7*
Outer regional	1.3	2.0	1.2	0.9
	0.9–1.7	*0.9–3.1*	*0.8–1.6*	*0.6–1.2*
Remote/Very remote	2.2	3.1	1.8	1.6
	0.6–3.9	*0.7–5.6*	*0.6–3.1*	*0.4–2.8*
Reason for last dental visit				
Check-up	0.8	0.8	0.8	0.8
	0.6–0.9	*0.5–1.1*	*0.6–1.1*	*0.5–1.0*
Dental problem	2.9	4.7	2.8	1.8
	2.3–3.4	*3.3–6.1*	*1.9–3.8*	*1.3–2.3*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Missing due to dental caries

Prevalence of primary teeth missing due to dental caries

Primary teeth may be missing due to dental caries or other reasons such as trauma or normal exfoliation. Table 4.4 shows the proportion of children who have at least one tooth missing due to dental caries. Over 6% of children aged 5–10 years had at least one missing primary tooth due to dental caries. There were 1.6 times more children aged 7–8 years who had at least one missing tooth (8.0 %) relative to children aged 5–6 years (5.0%). The highest proportion of children with at least one missing primary tooth due to dental caries was seen among children who last made a dental visit because of a dental problem (16.0%) and the lowest (3.7%) among children who attended for a check-up.

Significant differences in the proportion of children with missing teeth due to dental caries were seen between children of parents who completed only school-level education (10.1%) and those whose parents completed some vocational level education (3.7%) and those of parents with some tertiary education (5.2%). The relative difference was 2.7-fold between school and vocationally educated parents and 1.9-fold between school and tertiary educated parents. Among children aged 7–8 years there was a 2.1-fold relative difference in the prevalence of missing teeth due to dental caries of children whose parents completed only school-level education (12.4%) and those of parents with some tertiary education (5.8%).

A higher proportion of children from low income households had at least one missing primary tooth due to dental caries (9.8%) than children from medium income households (4.4%) and high income households (3.5%). The relative difference between the proportions from low and medium income households was 2.2-fold and between low income and high income households was 2.8-fold. Three times as many children aged 7–8 years from low income households had at least one missing tooth due to dental caries (11.9%) compared to those from high income households (3.9%).

Among children aged 5–6 years, the proportion of children from major cities with at least one missing tooth due to dental caries (5.8%) was 4.8 times that of children from outer regional areas (1.2%).

The greatest relative difference in the proportion of children with at least one missing tooth was seen between children who attended a clinic for a dental problem (16.0%) and those who attended for a check-up (3.7%). A 4.3-fold difference existed among all children, an 8-fold difference among children aged 5–6 years (19.3% compared with 2.4%), a 4-fold difference among children aged 7–8 years (19.4% compared with 4.8%) and a 3-fold difference among children aged 9–11 years (10.9% compared with 3.6%).

In summary, differences in the proportion of children with at least one missing primary tooth due to dental caries related to age group, parental education, household income, residential location and reason for last dental visit.

Table 4.4: Percentage of children with missing teeth due to dental caries in primary dentition in the Queensland child population

		Population: children aged 5–10 years		
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**
All	**6.1**	**5.0**	**8.0**	**5.5**
	4.9–7.0	*3.5–6.0*	*6.2–10.0*	*4.1–7.0*
Sex				
Male	6.1	4.4	8.4	5.6
	4.8–7.0	*2.8–6.0*	*6.0–11.0*	*3.6–8.0*
Female	6.1	5.5	7.7	5.2
	4.5–8.0	*3.6–8.0*	*4.7–12.0*	*3.3–8.0*
Indigenous identity				
Non-Indigenous	5.9	4.8	7.6	5.5
	4.7–7.0	*3.3–6.0*	*5.8–9.0*	*4.1–7.0*
Indigenous	8.4	7.5	12.6	4.9
	4.5–15.0	*3.2–16.0*	*7.0–21.0*	*1.1–19.0*
Parent country of birth				
Australian born	5.8	4.8	7.5	5.0
	4.3–7.0	*3.2–7.0*	*5.2–10.0*	*3.3–7.0*
Overseas born	6.7	5.2	8.8	6.1
	4.8–9.0	*3.3–8.0*	*5.8–13.0*	*3.9–9.0*
Parental education				
School	10.1	9.0	12.4	8.6
	7.4–13.0	*5.4–14.0*	*8.4–17.0*	*5.5–13.0*
Vocational training	3.7	3.3	6.5	1.8
	2.3–5.0	*1.5–6.0*	*3.2–12.0*	*0.7–4.0*
Tertiary education	5.2	4.0	5.8	5.7
	3.8–6.0	*2.4–6.0*	*3.8–8.0*	*3.8–8.0*
Household income				
Low	9.8	9.1	11.9	8.6
	7.2–13.0	*5.7–14.0*	*8.2–16.0*	*5.8–12.0*
Medium	4.4	3.8	6.6	3.0
	3.1–6.0	*2.1–6.0*	*4.4–10.0*	*1.7–5.0*
High	3.5	2.1	3.9	4.4
	2.2–5.0	*0.7–6.0*	*2.0–7.0*	*2.2–8.0*
Residential location				
Major city	6.5	5.8	7.5	6.2
	4.6–8.0	*3.6–9.0*	*5.0–10.0*	*4.3–8.0*
Inner regional	7.4	5.1	12.4	5.1
	4.3–12.0	*2.5–9.0*	*7.5–19.0*	*1.8–13.0*
Outer regional	3.9	1.2	5.6	4.7
	2.9–5.0	*0.5–2.0*	*3.8–8.0*	*2.8–7.0*
Remote/Very remote	6.9	7.3	9.5	3.9
	3.8–12.0	*3.5–14.0*	*3.7–22.0*	*1.5–9.0*
Reason for last dental visit				
Check-up	3.7	2.4	4.8	3.6
	2.7–5.0	*1.3–4.0*	*3.1–7.0*	*2.4–5.0*
Dental problem	16.0	19.3	19.4	10.9
	12.7–19.0	*12.7–28.0*	*14.4–25.0*	*7.7–15.0*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Number of primary teeth missing due to dental caries

Teeth may be missing for a number of reasons. In children, the reasons include dental disease such as dental caries, but teeth may also be missing due to natural exfoliation or because they did not erupt into the mouth. In this Survey, only teeth which have been extracted because of dental caries have been included in the data on teeth missing due to dental caries; see Table 4.5.

Among Queensland children aged 5–10 years, 0.1 primary teeth were missing due to dental caries and there was no difference by age group. The highest number of missing teeth was found in children who last made a dental visit for a problem (0.4 teeth).

Children whose parents had completed only school-level education, had twice the number of missing primary teeth (0.2 teeth) than children whose parents had some vocational or some tertiary education (0.1 teeth). A 3-fold difference was also seen among children aged 5–6 years between children whose parents had only school-level education (0.3 teeth) and those children whose parents had some vocational or tertiary level education (0.1 teeth).

Children from low income households had twice the number of missing primary teeth (0.2 teeth) compared to children from high income households (0.1 teeth). This difference was more marked among children aged 5–6 years with 0.2 teeth missing among those from low income households and none from high income households.

The largest relative differences were seen by reason for last dental visit. Children who last visited a dentist for a problem had four times the number of missing teeth (0.4 teeth) compared to those who visited for a check-up (0.1 teeth). Among children aged 5–6 years the difference was 6-fold and 4-fold among children aged 7–8 years.

In summary, there were few missing primary teeth due to dental caries, but more were missing among children of parents whose highest level of education was school-level, those from low income households and children who made their last dental visit for a problem.

Table 4.5: Number of primary teeth missing due to dental caries per child in the Queensland child population

	Population: children aged 5–10 years			
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**
All	**0.1**	**0.1**	**0.2**	**0.1**
	0.1–0.2	*0.1–0.2*	*0.1–0.2*	*0.1–0.1*
Sex				
Male	0.1	0.1	0.2	0.1
	0.1–0.2	*0.1–0.2*	*0.1–0.2*	*0.0–0.2*
Female	0.1	0.1	0.2	0.1
	0.1–0.2	*0.1–0.2*	*0.1–0.3*	*0.0–0.2*
Indigenous identity				
Non-Indigenous	0.1	0.1	0.2	0.1
	0.1–0.2	*0.1–0.2*	*0.1–0.2*	*0.1–0.1*
Indigenous	0.2	0.3	0.3	0.1
	0.1–0.4	*0.1–0.6*	*0.1–0.4*	*0.1–0.3*
Parent country of birth				
Australian born	0.1	0.1	0.2	0.1
	0.1–0.2	*0.1–0.2*	*0.1–0.2*	*0.0–0.2*
Overseas born	0.2	0.1	0.2	0.1
	0.1–0.2	*0.1–0.2*	*0.1–0.3*	*0.1–0.2*
Parental education				
School	0.2	0.3	0.2	0.2
	0.2–0.3	*0.1–0.4*	*0.1–0.4*	*0.1–0.3*
Vocational training	0.1	0.1	0.2	0.0
	0.0–0.1	*0.0–0.1*	*0.0–0.3*	*0.0–0.1*
Tertiary education	0.1	0.1	0.1	0.1
	0.1–0.1	*0.0–0.1*	*0.0–0.2*	*0.0–0.1*
Household income				
Low	0.2	0.2	0.3	0.2
	0.2–0.3	*0.1–0.4*	*0.1–0.4*	*0.1–0.3*
Medium	0.1	0.1	0.1	0.0
	0.0–0.2	*0.0–0.2*	*0.1–0.2*	*0.0–0.1*
High	0.1	0.0	0.1	0.1
	0.0–0.1	*0.0–0.0*	*0.0–0.1*	*0.0–0.2*
Residential location				
Major city	0.1	0.1	0.2	0.1
	0.1–0.2	*0.1–0.2*	*0.1–0.3*	*0.1–0.2*
Inner regional	0.2	0.2	0.3	0.1
	0.0–0.3	*0.0–0.3*	*0.1–0.5*	*0.0–0.2*
Outer regional	0.1	0.0	0.1	0.1
	0.1–0.1	*0.0–0.1*	*0.1–0.2*	*0.0–0.2*
Remote/Very remote	0.2	0.2	0.2	0.1
	0.1–0.3	*0.0–0.4*	*0.0–0.4*	*0.0–0.2*
Reason for last dental visit				
Check-up	0.1	0.1	0.1	0.1
	0.0–0.1	*0.0–0.1*	*0.1–0.1*	*0.0–0.1*
Dental problem	0.4	0.6	0.4	0.2
	0.3–0.5	*0.3–0.9*	*0.2–0.6*	*0.1–0.3*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Number of filled primary teeth due to dental caries

Fillings to treat dental caries leave a permanent mark on the tooth and are one measure of children's experience of dental caries. Teeth filled as a result of dental trauma are separately identified. Filled teeth also indicate patterns of dental treatment and access to dental care.

Children aged 5–10 years had one filled primary tooth (Table 4.6), with children aged 5–6 years having fewer filled teeth (0.7 teeth). There were few differences between groups for filled teeth. Children who made their last dental visit for a problem had the highest number of filled teeth (2.0 teeth) and children from high income households had the lowest (0.8 teeth).

Children whose parents had only school-level education had somewhat higher numbers of filled teeth (1.2 teeth) compared to children whose parents had some tertiary level education (0.9 teeth), a 1.3-fold difference.

Children from low income households had 1.5 times more filled teeth (1.2 teeth) relative to children from high income households (0.8 teeth).

Reason for last visit showed the most variation with children who visited for a problem consistently having higher numbers of filled teeth. Among all children, those who last visited for a problem had more than twice the number of filled teeth (2.2 teeth) relative to those who visited for a check-up. For children aged 5–6 years the relative difference was 3.0-fold (1.8 compared with 0.6 teeth), for children aged 7–8 years it was 2.2-fold (2.2 compared with 1.0 teeth) and for children aged 9–10 years the relative difference was 2.0-fold (2.0 compared with 1.0 teeth).

In summary, parental education, household income and reason for last dental visit were associated with the number of filled primary teeth due to dental caries.

Table 4.6: Average number of filled primary teeth per child in the Queensland child population

		Population: children aged 5–10 years		
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**
All	**1.0**	**0.7**	**1.2**	**1.2**
	0.9–1.1	*0.5–0.8*	*1.1–1.4*	*1.0–1.4*
Sex				
Male	1.0	0.6	1.2	1.2
	0.9–1.1	*0.4–0.8*	*1.1–1.4*	*1.0–1.4*
Female	1.0	0.7	1.2	1.2
	0.9–1.2	*0.5–0.9*	*1.0–1.5*	*1.0–1.5*
Indigenous identity				
Non-Indigenous	1.0	0.6	1.2	1.2
	0.9–1.1	*0.5–0.8*	*1.1–1.4*	*1.0–1.3*
Indigenous	1.3	1.0	1.4	1.4
	0.9–1.6	*0.6–1.4*	*1.0–1.8*	*0.8–2.0*
Parent country of birth				
Australian born	1.1	0.8	1.2	1.2
	1.0–1.2	*0.6–1.0*	*1.0–1.4*	*1.0–1.4*
Overseas born	1.0	0.5	1.3	1.2
	0.9–1.1	*0.3–0.6*	*1.1–1.6*	*1.0–1.4*
Parental education				
School	1.2	0.9	1.3	1.5
	1.1–1.4	*0.6–1.2*	*1.1–1.5*	*1.2–1.8*
Vocational training	1.1	0.8	1.3	1.2
	0.9–1.2	*0.5–1.0*	*0.9–1.7*	*0.9–1.5*
Tertiary education	0.9	0.5	1.2	1.1
	0.8–1.0	*0.3–0.7*	*1.0–1.4*	*0.9–1.3*
Household income				
Low	1.2	0.9	1.4	1.4
	1.1–1.4	*0.6–1.1*	*1.1–1.7*	*1.2–1.7*
Medium	1.0	0.6	1.2	1.2
	0.9–1.1	*0.5–0.8*	*1.0–1.4*	*1.0–1.4*
High	0.8	0.5	1.1	0.9
	0.7–1.0	*0.2–0.7*	*0.8–1.4*	*0.6–1.1*
Residential location				
Major city	1.0	0.6	1.2	1.0
	0.8–1.1	*0.5–0.8*	*1.0–1.5*	*0.9–1.2*
Inner regional	1.0	0.7	1.3	1.2
	0.8–1.2	*0.4–1.0*	*0.9–1.7*	*0.8–1.6*
Outer regional	1.1	0.5	1.2	1.5
	0.9–1.3	*0.3–0.6*	*1.0–1.5*	*1.1–1.8*
Remote/Very remote	1.2	1.2	1.1	1.5
	0.9–1.6	*0.5–1.9*	*0.7–1.4*	*1.2–1.8*
Reason for last dental visit				
Check-up	0.9	0.6	1.0	1.0
	0.8–1.0	*0.4–0.8*	*0.8–1.2*	*0.8–1.1*
Dental problem	2.0	1.8	2.2	2.0
	1.8–2.2	*1.3–2.2*	*1.9–2.6*	*1.7–2.3*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Number of filled primary tooth surfaces due to dental caries

Fillings for dental caries may be on a single tooth surface or on multiple surfaces of a tooth. Fillings counted in Table 4.7 were those placed for treatment of dental caries and not for other reasons such as trauma. The number of filled tooth surfaces on the primary teeth of Queensland children was 2.3 surfaces, with fewer on children aged 5–6 years (1.4 surfaces) and more on children aged 7–8 years (2.8 surfaces) and children aged 9–10 years (2.6 surfaces). Children who last visited for a dental problem had the most filled surfaces (4.5 surfaces) and those who attended for a check-up had the least (1.9 surfaces).

Children whose parents had only school-level education had higher numbers of filled surfaces (2.8 surfaces) compared to children whose parents had some tertiary level education (2.0 surfaces) a 1.4-fold relative difference.

Reason for last visit showed the most variation with children who last visited for a problem consistently having higher numbers of filled primary tooth surfaces. Among all children, those who last visited for a problem had 2.4 times the number of filled surfaces (4.5 surfaces) relative to those who visited for a check-up (1.9 surfaces). For children aged 5–6 years the relative difference was 2.8-fold (3.7 compared with 1.3 surfaces), for children aged 7–8 years it was 2.2-fold (5.1 compared with 2.3 surfaces) and for children aged 10 years the relative difference was 2.3-fold (4.5 compared with 2.0 surfaces).

In summary, parental education, household income and reason for last dental visit were associated with the number of filled primary tooth surfaces due to dental caries.

Table 4.7: Number of filled tooth surfaces due to dental caries per child in primary dentition in the Queensland child population

		Population: children aged 5–10 years		
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**
All	**2.3**	**1.4**	**2.8**	**2.6**
	2.1–2.5	*1.1–1.7*	*2.4–3.3*	*2.2–3.0*
Sex				
Male	2.3	1.3	2.8	2.5
	2.0–2.5	*0.9–1.8*	*2.3–3.4*	*2.1–3.0*
Female	2.3	1.5	2.8	2.6
	2.0–2.6	*1.1–1.9*	*2.1–3.5*	*2.1–3.2*
Indigenous identity				
Non-Indigenous	2.2	1.4	2.8	2.6
	2.0–2.5	*1.1–1.7*	*2.4–3.3*	*2.2–2.9*
Indigenous	2.5	1.8	2.8	2.9
	1.9–3.2	*0.8–2.7*	*1.9–3.6*	*1.6–4.3*
Parent country of birth				
Australian born	2.3	1.7	2.7	2.6
	2.0–2.5	*1.3–2.1*	*2.2–3.2*	*2.1–3.0*
Overseas born	2.2	1.0	3.1	2.6
	1.9–2.6	*0.7–1.4*	*2.3–3.9*	*2.1–3.1*
Parental education				
School	2.8	2.1	2.9	3.5
	2.3–3.3	*1.3–2.9*	*2.3–3.5*	*2.8–4.2*
Vocational training	2.3	1.5	3.2	2.4
	1.8–2.8	*0.9–2.0*	*1.8–4.6*	*1.7–3.1*
Tertiary education	2.0	1.1	2.7	2.3
	1.7–2.2	*0.7–1.5*	*2.2–3.2*	*1.8–2.7*
Household income				
Low	2.7	1.9	3.1	3.1
	2.3–3.1	*1.4–2.4*	*2.4–3.8*	*2.5–3.7*
Medium	2.1	1.4	2.6	2.5
	1.8–2.4	*0.9–1.9*	*2.0–3.2*	*2.0–2.9*
High	2.0	0.9	3.1	2.0
	1.5–2.5	*0.4–1.4*	*1.9–4.3*	*1.2–2.8*
Residential location				
Major city	2.2	1.5	2.9	2.4
	1.9–2.5	*1.0–1.9*	*2.3–3.5*	*1.9–2.9*
Inner regional	2.6	1.5	3.6	2.7
	1.9–3.2	*0.8–2.3*	*2.2–5.0*	*1.8–3.6*
Outer regional	2.1	0.8	2.4	2.9
	1.7–2.4	*0.5–1.1*	*1.9–2.8*	*2.2–3.7*
Remote/Very remote	2.4	2.1	2.1	3.0
	1.7–3.1	*0.7–3.6*	*1.3–2.9*	*2.3–3.7*
Reason for last dental visit				
Check-up	1.9	1.3	2.3	2.0
	1.7–2.2	*0.9–1.8*	*1.8–2.8*	*1.6–2.4*
Dental problem	4.5	3.7	5.1	4.5
	4.0–5.1	*2.7–4.7*	*4.3–6.0*	*3.7–5.3*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Total caries experience in the primary dentition (dmft)

Prevalence of caries experience in primary teeth

Children whose Survey examination revealed untreated decay, teeth missing or filled primary teeth due to dental caries were classified as having primary caries experience. Such children had a summed score of teeth involved, dmft score greater than zero.

Almost half (49.5%) of all children aged 5–10 years had experience of dental caries (Table 4.8). This percentage increased across the age groups with a higher percentage of children aged 7–8 years (53.9%) and 9–10 years (54.2%) having caries experience than children aged 5–6 years (40.7%).

Among different population groups, children whose last dental visit was for a problem had the highest percentage with caries experience (79.6%), whereas children from high income households had the lowest (38.9%). Other differences observed related to Indigenous identity and parental education.

Among children of all ages, experience of dental caries was almost 1.4 times more prevalent among Indigenous children (69.1%) than non-Indigenous children (47.7%) and about 1.3 times more prevalent among children whose parents had only school-level education (60.0%) than children whose parents had some vocational (46.2%) or tertiary level education (44.9%). Caries experience in children from low income households (56.5%) was 1.2 times more prevalent than children from medium income households (47.4%) and 1.5 times higher than those from high income households (38.9%). The prevalence was over 1.9 times higher for children who last made a dental visit for a problem (79.6%) relative to those who last visited for a check-up (42.8%).

There were no significant differences among groups by sex, parental country of birth or residential location.

The largest differences were apparent among children aged 5–6 years with a 1.9-fold difference in caries experience between Indigenous (72.6%) and non-Indigenous (38.3%), a 1.6-fold difference between children whose parents had only school-level education (55.1%) and those children whose parents had some tertiary education (34.4%). Similarly among children aged 5–6 years the prevalence of caries experience in the primary dentition was 1.7 times higher for children from a low income household (52.7%) relative to children from a high income household (30.5%), and 2.4 times higher for children aged 5–6 years who last visited for a problem (81.7%) than those who had last visited for a check-up (33.7%).

In summary, more children from disadvantaged backgrounds including Indigenous identity, those whose parents had less education, and those who were from low income households, had caries experience in their primary dentition, as did children whose last dental visit was for a problem. These differences were more marked in younger children.

Table 4.8: Percentage of children with caries experience in primary teeth in the Queensland child population

	Population: children aged 5–10 years			
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**
All	**49.5**	**40.7**	**53.9**	**54.2**
	46.9–52.0	*36.4–45.1*	*49.5–58.2*	*51.0–57.3*
Sex				
Male	49.8	39.7	54.7	54.5
	46.6–52.9	*34.3–45.3*	*49.4–59.9*	*49.7–59.1*
Female	49.2	41.7	53.0	53.8
	46.0–52.3	*36.0–47.5*	*47.0–58.8*	*48.9–58.6*
Indigenous identity				
Non-Indigenous	47.7	38.3	51.8	53.5
	45.3–50.1	*34.2–42.5*	*47.5–56.0*	*50.2–56.9*
Indigenous	69.1	72.6	75.1	60.5
	60.8–76.2	*57.8–83.6*	*62.9–84.3*	*49.1–70.7*
Parent country of birth				
Australian born	48.4	39.7	52.2	53.6
	45.4–51.3	*35.1–44.4*	*46.4–57.9*	*49.1–58.1*
Overseas born	51.1	42.2	56.3	54.9
	47.4–54.8	*35.7–48.9*	*49.7–62.7*	*49.9–59.7*
Parental education				
School	60.0	55.1	61.6	63.4
	55.9–64.0	*47.1–62.7*	*54.3–68.4*	*58.0–68.4*
Vocational training	46.2	37.2	49.0	52.9
	41.6–50.9	*29.2–46.0*	*40.6–57.3*	*46.4–59.2*
Tertiary education	44.9	34.4	50.7	50.3
	41.7–48.1	*28.9–40.3*	*45.3–56.1*	*45.9–54.6*
Household income				
Low	56.5	52.7	56.3	59.9
	53.1–59.7	*46.3–59.0*	*49.1–63.2*	*55.0–64.7*
Medium	47.4	34.7	54.8	54.7
	44.3–50.5	*30.1–39.5*	*49.1–60.3*	*49.4–59.8*
High	38.9	30.5	44.6	41.4
	33.6–44.5	*22.5–40.0*	*36.0–53.4*	*33.0–50.2*
Residential location				
Major city	47.6	40.1	53.0	50.3
	43.8–51.4	*34.0–46.5*	*46.5–59.3*	*45.8–54.7*
Inner regional	50.1	38.8	55.2	57.9
	44.6–55.6	*29.9–48.5*	*44.8–65.1*	*49.1–66.1*
Outer regional	49.1	36.3	51.5	57.8
	44.8–53.4	*29.8–43.4*	*45.1–57.7*	*51.8–63.6*
Remote/Very remote	58.7	57.6	58.8	59.9
	49.7–67.1	*42.2–71.6*	*43.8–72.3*	*51.7–67.5*
Reason for last dental visit				
Check-up	42.8	33.7	44.9	47.8
	39.9–45.7	*29.0–38.7*	*39.9–50.0*	*43.9–51.7*
Dental problem	79.6	81.7	84.5	74.0
	75.9–82.9	*71.1–88.9*	*78.1–89.3*	*67.8–79.2*

Row 1: Per cent of children.
Row 2: 95%CI: 95% confidence interval for estimated per cent.
Columns are arranged by age at time of the Survey.

Number of decayed, missing or filled teeth (dmft)

The number of decayed, missing or filled teeth measures the caries experience of a child. Caries observed as cavities in enamel cannot 'heal' and the treatment leaves a permanent mark, either through the presence of a filling or the loss of a tooth missing through extraction. Care was taken in this Survey to distinguish between teeth lost through extraction due to caries and teeth lost in the normal process of exfoliation. Only the former were included in this assessment. The 'dmft' index is a widely used summary index for caries experience in primary teeth, comprising an individual's total number of primary teeth which are decayed, missing or filled due to caries.

Table 4.9 presents the number of primary teeth with caries experience among children aged 5–10 years. The number of primary teeth with caries experience among children aged 5–10 years was 2.0 teeth, with a somewhat higher number (2.2 teeth) found in children aged 7–8 years. The highest number of primary teeth with caries experience was found among children who last made a dental visit for a problem (3.9 teeth) and the lowest among children from high income households (1.3 teeth).

Indigenous children had 1.6 times more teeth with caries experience (3.1 teeth) than non-Indigenous children (1.9 teeth), and among children aged 5–6 years Indigenous children had twice the number of teeth with caries experience (3.5 teeth) than non-Indigenous children (1.7 teeth) and Indigenous children aged 7–8 years had 1.6 times the number of teeth with caries experience (3.3 teeth) than non-Indigenous children (2.1 teeth).

Children whose parents' highest level of education was school-level had higher numbers of teeth with caries experience than children whose parents had some tertiary education. Among all children there was a 1.6-fold relative difference between the number of primary teeth with caries experience in children whose parents had completed only school-level education (2.7 teeth) and those children whose parents had some vocational or tertiary education (1.7 teeth). Differences between subgroups by parental education were also observed across all age groups.

Household income was associated with caries experience in all age groups. Among all children those in low income households had 1.4 times the number of caries affected primary teeth (2.6 teeth) than children from medium income households (1.8 teeth) and 2.0 times the number for children from high income households (1.3 teeth). The differences between subgroups by household income were observed across all age groups with the largest difference among the youngest age group.

Children whose last dental visit was for a problem had significantly higher dmft scores than children whose last visit was for a check-up. Among children aged 5–10 years, there was a relative difference of 2.6-fold between those children who visited for a problem (3.9 teeth) and those who visited for a check-up (1.5 teeth). The reason for last dental visit was highly significantly associated with mean dmft score across all age groups. The relative difference was largest among children aged 5–6 years.

In summary, caries experience at a tooth level was associated with Indigenous identity, parental education, household income and reason for last dental visit.

Table 4.9: Number of decayed, missing or filled primary teeth per child in the Queensland child population

	Population: children aged 5–10 years			
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**
All	**2.0**	**1.8**	**2.2**	**1.9**
	1.8–2.2	*1.6–2.1*	*2.0–2.5*	*1.7–2.1*
Sex				
Male	2.0	1.8	2.2	1.9
	1.8–2.2	*1.4–2.1*	*2.0–2.5*	*1.7–2.2*
Female	2.0	1.9	2.2	1.9
	1.8–2.2	*1.5–2.3*	*1.8–2.6*	*1.6–2.2*
Indigenous identity				
Non-Indigenous	1.9	1.7	2.1	1.9
	1.7–2.1	*1.5–2.0*	*1.9–2.4*	*1.7–2.1*
Indigenous	3.1	3.5	3.3	2.5
	2.5–3.7	*2.2–4.8*	*2.7–4.0*	*1.8–3.1*
Parent country of birth				
Australian born	1.9	1.8	2.0	1.9
	1.7–2.1	*1.5–2.1*	*1.7–2.3*	*1.6–2.2*
Overseas born	2.1	1.9	2.5	2.0
	1.9–2.4	*1.5–2.4*	*2.1–2.9*	*1.7–2.2*
Parental education				
School	2.7	3.0	2.8	2.4
	2.4–3.1	*2.4–3.6*	*2.4–3.3*	*2.0–2.8*
Vocational training	1.7	1.6	2.0	1.7
	1.5–2.0	*1.2–2.0*	*1.4–2.5*	*1.4–2.0*
Tertiary education	1.7	1.4	1.9	1.8
	1.5–1.9	*1.0–1.7*	*1.7–2.2*	*1.5–2.0*
Household income				
Low	2.6	2.8	2.7	2.4
	2.4–2.8	*2.3–3.3*	*2.3–3.0*	*2.0–2.7*
Medium	1.8	1.4	2.1	1.8
	1.6–1.9	*1.1–1.8*	*1.8–2.4*	*1.5–2.1*
High	1.3	1.1	1.6	1.3
	1.1–1.5	*0.7–1.4*	*1.2–2.0*	*0.9–1.6*
Residential location				
Major city	1.9	1.8	2.3	1.7
	1.7–2.2	*1.4–2.2*	*1.9–2.6*	*1.5–2.0*
Inner regional	1.9	1.6	2.2	2.0
	1.6–2.2	*1.1–2.1*	*1.6–2.7*	*1.6–2.4*
Outer regional	1.9	1.6	2.1	2.1
	1.7–2.2	*1.0–2.1*	*1.7–2.4*	*1.7–2.5*
Remote/Very remote	2.7	3.1	2.3	2.5
	2.0–3.3	*1.9–4.3*	*1.5–3.2*	*2.1–2.8*
Reason for last dental visit				
Check-up	1.5	1.2	1.7	1.5
	1.3–1.6	*0.9–1.5*	*1.4–1.9*	*1.3–1.7*
Dental problem	3.9	4.8	4.2	3.2
	3.6–4.2	*4.0–5.7*	*3.7–4.7*	*2.8–3.6*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Number of decayed, missing or filled primary tooth surfaces (dmfs)

The number of decayed, missing and filled tooth surfaces (dmfs) measures the accumulation of caries experience at the tooth surface level for a child over their lifetime. The 'dmfs' index is a widely used index for primary tooth surfaces comprising an individual's total number of tooth surfaces which are decayed, missing or filled due to caries.

The number of primary tooth surfaces with caries experience among children aged 5–10 years was 4.1 surfaces, with a somewhat higher number (4.7 surfaces) found in children aged 7–8 years (Table 4.10). The highest number of primary surfaces with caries experience was found among children who last made a dental visit for a problem (8.5 surfaces) and the lowest among children from high income households (2.9 surfaces) and children who visited for a check-up (2.9 surfaces).

Indigenous children had 1.6 times more caries experience (6.4 surfaces) than non-Indigenous children (3.9 surfaces), and among children aged 7–8 years Indigenous children had 1.5 times the number of surfaces affected by caries (6.7 surfaces) than non-Indigenous children (4.6 surfaces).

Children of parents whose highest level of education was school-level had consistently higher numbers of tooth surfaces with caries experience than children whose parents had a tertiary education. Among all children there was a 1.7-fold relative difference between the number of primary surfaces with caries experience in children whose parents had completed only school-level education (6.0 surfaces) and those children whose parents had a vocational education only (3.5 surfaces), and a 1.8-fold difference between children of school and tertiary educated parents (6.0 verse 3.4 surfaces). Significant differences were observed between subgroups by parental education across all age groups with the largest relative difference among children aged 7–8 years.

Household income was associated with caries experience in all age groups. Among all children those in low income households had 1.6 times the number of caries affected primary tooth surfaces (5.5 surfaces) than children from medium income households (3.5 surfaces) and 1.9 times the number of children from high income households (2.9 surfaces). Among children aged 5–6 years those from low income households had twice the number of affected surfaces (5.9 surfaces) as those from medium income households (2.9 surfaces) and over three times the number for children from high income households (1.9 surfaces). The differences were less marked in the older age groups.

Children whose last dental visit was for a problem had significantly higher average dmfs scores than children whose last visit was for a check-up. Among children aged 5–10 years there was a relative difference of 2.9-fold between those who visited for a problem (8.5 surfaces) and those who visited for a check-up (2.9 surfaces). The relative difference was largest among children aged 5–6 years with those who last visited for a problem having 4.4 times the number of affected primary tooth surfaces (10.1 surfaces) than children who attended for a check-up (2.3 surfaces).

In summary, total caries experience at a tooth surface level was associated with Indigenous identity, parental education, household income and reason for last dental visit.

Table 4.10: Number of decayed, missing or filled tooth surfaces of the primary dentition in the Queensland child population

		Population: children aged 5–10 years		
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**
All	**4.1**	**3.7**	**4.7**	**4.0**
	3.7–4.6	*3.1–4.4*	*4.1–5.4*	*3.5–4.5*
Sex				
Male	4.1	3.5	4.7	4.0
	3.7–4.5	*2.8–4.3*	*4.0–5.4*	*3.5–4.6*
Female	4.2	3.9	4.8	3.9
	3.6–4.7	*3.0–4.9*	*3.8–5.8*	*3.1–4.7*
Indigenous identity				
Non-Indigenous	3.9	3.5	4.6	3.8
	3.6–4.3	*2.9–4.1*	*3.9–5.2*	*3.3–4.3*
Indigenous	6.4	7.0	6.7	5.5
	4.7–8.0	*3.4–0.7*	*5.3–8.1*	*3.9–7.2*
Parent country of birth				
Australian born	3.9	3.6	4.2	3.9
	3.4–4.4	*2.9–4.3*	*3.5–5.0*	*3.2–4.6*
Overseas born	4.5	4.0	5.5	4.1
	3.8–5.1	*2.9–5.0*	*4.4–6.6*	*3.4–4.8*
Parental education				
School	6.0	6.6	6.0	5.3
	5.0–6.9	*4.9–8.2*	*4.9–7.2*	*4.3–6.3*
Vocational training	3.5	2.9	4.5	3.3
	3.0–4.1	*2.1–3.8*	*3.0–6.0*	*2.5–4.2*
Tertiary education	3.4	2.7	4.1	3.5
	3.0–3.8	*1.9–3.4*	*3.3–4.8*	*3.0–4.1*
Household income				
Low	5.5	5.9	5.7	5.0
	4.9–6.1	*4.8–7.1*	*4.7–6.7*	*4.2–5.8*
Medium	3.5	2.9	4.2	3.4
	3.0–3.9	*2.1–3.7*	*3.3–5.0*	*2.9–4.0*
High	2.9	1.9	4.0	2.7
	2.4–3.5	*1.1–2.6*	*2.7–5.3*	*1.9–3.6*
Residential location				
Major city	4.1	3.8	4.9	3.7
	3.5–4.7	*2.9–4.7*	*4.0–5.8*	*3.0–4.4*
Inner regional	4.2	3.2	5.4	4.2
	3.3–5.2	*2.0–4.5*	*3.7–7.2*	*3.1–5.2*
Outer regional	3.6	2.9	3.9	4.1
	3.1–4.2	*1.7–4.1*	*3.1–4.6*	*3.1–5.1*
Remote/Very remote	5.2	6.0	4.6	4.9
	3.4–6.9	*3.1–8.9*	*2.8–6.3*	*3.7–6.1*
Reason for last dental visit				
Check-up	2.9	2.3	3.4	3.0
	2.6–3.3	*1.6–2.9*	*2.8–4.0*	*2.5–3.5*
Dental problem	8.5	10.1	9.3	6.9
	7.7–9.4	*8.0–12.2*	*8.0–10.7*	*5.9–7.9*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Prevalence of children with severe caries experience in the primary dentition

There was a small proportion of children who accumulate a greater level of caries experience. Having at least one-fifth of the full primary dentition, 4 or more teeth with caries experience was defined as having severe dental caries experience in the primary dentition (Table 4.11). More than one-fifth (23.5%) of children aged 5–10 years in the Queensland child population were classified as having severe caries experience. This percentage was highest in children aged 7–8 years (27.7%) and lowest in children aged 5–6 years (20.4%).

For all ages combined, the prevalence of severe caries experience in the primary dentition was highest among children whose last visit was for a dental problem (50.0%) followed by Indigenous children (37.2%). These differences were statistically significant against their respective counterparts. The prevalence of having severe caries experience for children whose parents had completed only school-level education (34.1%) was 1.8 times higher than for children whose parents had some tertiary education (18.5%). Children from high income (14.4%) or medium income (19.9%) households had a significantly lower proportion with severe caries experience than those from low income households (31.6%). Children from the remote/very remote areas also had a significantly higher prevalence of severe caries experience than those from major cities. The largest relative difference between population groups was between children whose last dental visit was for a problem and those who visited for a check-up.

Across age groups, the largest relative difference was found between children aged 5–6 years whose last dental visit was for a dental problem (60.8%) and those whose last visit was for a check-up (11.3%). Children whose last visit was for a dental problem had consistently higher prevalence of severe caries experience across all age groups. Indigenous children aged 5–6 and 7–8 years also had significantly higher prevalence of severe caries experience in the primary dentition than non-Indigenous children. Those children aged 5–6 years and 7–8 years whose parents had only school-level education had a significantly higher prevalence of severe caries experience than children whose parents had at least some tertiary education. The difference between children from low income households and high income households were significant in all age groups.

In summary, more children from disadvantaged backgrounds including Indigenous identity, whose parents had less education or were from low income households and who lived in remote/very remote areas, were affected by severe caries experience in their primary teeth, as were children whose last dental visit was for a problem.

Table 4.11: Percentage of children with 4+ deciduous teeth affected by caries in the Queensland child population

		Population: children aged 5–10 years		
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**
All	**23.5**	**20.4**	**27.7**	**22.7**
	21.4–25.8	*17.4–23.8*	*24.2–31.4*	*19.7–25.9*
Sex				
Male	23.4	19.8	27.7	22.7
	20.8–26.2	*16.1–24.1*	*23.2–32.7*	*18.9–26.9*
Female	23.7	21.0	27.7	22.7
	20.9–26.7	*16.8–25.8*	*22.7–33.2*	*18.2–28.0*
Indigenous identity				
Non-Indigenous	22.3	19.1	26.0	22.0
	20.4–24.3	*16.2–22.3*	*22.6–29.8*	*19.1–25.2*
Indigenous	37.2	38.3	44.5	29.3
	27.9–47.5	*24.9–53.7*	*31.6–58.2*	*20.9–39.4*
Parent country of birth				
Australian born	23.1	20.9	25.3	23.1
	20.6–25.7	*17.1–25.2*	*21.1–30.1*	*19.0–27.7*
Overseas born	24.2	19.7	31.1	22.1
	21.2–27.4	*15.3–24.9*	*25.7–37.0*	*18.0–26.8*
Parental education				
School	34.1	35.9	37.7	28.3
	29.4–39.1	*28.3–44.3*	*30.9–45.0*	*21.8–35.7*
Vocational training	21.3	19.4	24.9	19.9
	18.0–24.9	*14.0–26.3*	*17.7–33.8*	*15.0–25.9*
Tertiary education	18.5	13.3	21.8	20.7
	16.2–21.0	*9.8–17.7*	*18.0–26.1*	*17.3–24.6*
Household Income				
Low	31.6	31.6	33.9	29.8
	28.4–35.0	*26.4–37.3*	*28.2–40.0*	*24.8–35.2*
Medium	19.9	15.4	25.0	20.0
	17.7–22.3	*11.8–19.9*	*20.4–30.2*	*16.4–24.3*
High	14.4	10.6	19.0	13.2
	11.4–18.0	*6.7–16.5*	*13.5–26.2*	*8.7–19.6*
Residential location				
Major city	21.9	18.7	27.9	19.2
	18.9–25.1	*14.9–23.2*	*22.7–33.7*	*15.3–23.9*
Inner regional	22.7	18.5	28.4	21.7
	19.3–26.5	*13.0–25.6*	*21.8–36.0*	*16.0–28.7*
Outer regional	23.4	17.8	24.4	27.4
	19.9–27.3	*12.4–24.8*	*18.7–31.0*	*21.1–34.6*
Remote/Very remote	34.2	39.1	30.7	32.3
	25.6–43.9	*27.2–52.4*	*17.8–47.4*	*24.1–41.7*
Reason for last dental visit				
Check-up	16.2	11.3	19.9	16.6
	14.2–18.4	*8.3–15.1*	*16.4–23.7*	*13.5–20.1*
Dental problem	50.0	60.8	52.9	41.0
	45.7–54.3	*51.2–69.5*	*45.3–60.3*	*33.9–48.5*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Prevalence and experience of dental caries in the primary dentition by regions

Dental caries in children can potentially vary not only between individuals and sociodemographic groups, but also between geographic regions. The prevalence and experience of dental caries in the primary dentition of children aged 5–10 years in Queensland varied between the four major regions (Table 4.12). Prevalence and experience of dental caries in the primary dentition are presented for all ages combined and for each of the three age groups.

The prevalence of dental caries in the primary dentition, i.e. the proportion of children with dmft score greater than 0, varied between the regions. For all four comparisons (all children aged 5–10 years and the three age groups) the prevalence of dental caries was highest in the Northern region and lowest in Townsville. For all ages combined, Townsville had a prevalence of dental caries that was significantly lower than that of the South-East and Northern regions. Townsville had a significantly lower prevalence of dental caries than the Northern region in all age groups. The difference was also significant between Townsville and the South-East region among the two older age groups. The largest actual difference was recorded among children aged 5–6 years between the Northern region and the Townsville region. The Brisbane, South East and Northern regions did not significantly differ in the prevalence of dental caries in the primary dentition.

The prevalence of severe caries experience in the primary dentition, i.e. the proportion of children having 4+ teeth with caries experience varied between regions. For all ages combined, children in Townsville had significantly lower prevalence of severe caries experience in the primary dentition than children from the South-East and Northern regions. Children in Townsville also had the lowest prevalence in all three age groups. The differences were statistically significant between the Townsville and Northern region in children aged 7–8 years and 9–10 years age groups, and between Townsville and the other two regions in the 7–8 years age group.

The dmft scores, i.e. number of decayed, missing or filled primary teeth per child, varied between the four geographical regions. For all four comparisons, children in the Northern region had the highest mean dmft score while children in Townsville had the lowest. For all ages combined, Townsville children had a significantly lower mean dmft score than that in all other regions. On average, children in Townsville had 26% to 38% fewer teeth affected by dental caries than children in other regions. There were no significant differences in the mean dmft scores between the other three regions. Comparing within age groups, Townsville children also had the lowest mean dmft scores. The difference was statistically significant between children aged 7–8 years in Townsville and children of the same age in all other regions and between children aged 9–10 years Townsville and children of the same age from the South-East and Northern regions.

The dmfs score, i.e. the number of decayed, missing or filled primary tooth surfaces per person, varied between the four regions of Queensland. For all comparisons, children in Townsville had the lowest mean dmfs score while children from the neighbouring Northern region had the highest mean dmfs score. For all ages combined, children in Townsville had significantly lower mean dmfs score against children in each of the other three regions. The largest difference (of 2.03 tooth surfaces) was recorded between the Northern and Townsville areas among children aged 5–6 years. There were statistically significant differences between children aged 7–8 years in Townsville and children of the same age group in the other three regions, and between children aged 9–10 years in Townsville and the Northern region.

In summary, the prevalence and severity of dental caries in the primary dentition of children in Queensland significantly varied between geographical regions. Children in Townsville had a lower prevalence and experience of caries than children in all other regions. Such differences

persisted in age group comparisons and in using different measures of dental caries. The largest difference was recorded between Townsville and socioeconomically similar areas in the Northern region of Queensland.

Table 4.12: Prevalence and experience of dental caries in the primary dentition by four regions of Queensland

		Population: children aged 5–10 years			
Major region		**Brisbane**	**South-East**	**Northern**	**Townsville**
Prevalence of caries experience					
All ages	**per cent**	**46.0**	**50.1**	**57.2**	**39.3**
	95%CI	*40.8–51.2*	*46.7–53.4*	*51.2–62.9*	*36.4–42.2*
5–6 years	per cent	38.5	38.9	52.2	31.8
	95%CI	*30.0–47.6*	*33.4–44.8*	*41.6–62.7*	*26.7–37.2*
7–8 years	per cent	48.7	56.8	58.5	42.7
	95%CI	*40.5–57.0*	*50.5–62.9*	*48.3–68.0*	*37.9–47.5*
9–10 years	per cent	51.3	54.7	60.8	43.6
	95%CI	*45.6–57.0*	*49.8–59.5*	*53.2–67.9*	*38.8–48.6*
Prevalence of severe caries experience					
All ages	**per cent**	**20.2**	**24.0**	**30.4**	**16.9**
	95%CI	*15.8-22.7*	*20.0-26.2*	*21.1-33.3*	*13.4-17.6*
5–6 years	per cent	16.5	20.7	29.0	14.2
	95%CI	*11.3-21.6*	*15.6-25.1*	*16.9-36.1*	*10.0-17.6*
7–8 years	per cent	27.0	27.3	32.5	18.0
	95%CI	*20.9-32.5*	*21.5-32.1*	*22.2-37.2*	*13.4-20.5*
9–10 years	per cent	17.3	24.1	29.6	18.5
	95%CI	*10.5-21.5*	*17.0-27.9*	*20.4-32.1*	*12.9-20.1*
Mean dmft scores					
All ages	**mean**	**1.9**	**2.0**	**2.4**	**1.4**
	95%CI	*1.6–2.2*	*1.8–2.3*	*1.9–2.8*	*1.3–1.6*
5–6 years	mean	1.6	1.8	2.4	1.2
	95%CI	*1.2–2.1*	*1.4–2.2*	*1.6–3.2*	*0.9–1.5*
7–8 years	mean	2.2	2.2	2.4	1.5
	95%CI	*1.8–2.7*	*1.8–2.6*	*1.9–3.0*	*1.3–1.8*
9–10 years	mean	1.7	2.0	2.2	1.5
	95%CI	*1.4–2.0*	*1.7–2.3*	*1.9–2.5*	*1.3–1.7*
Mean dmfs scores					
All ages	**mean**	**3.9**	**4.3**	**4.4**	**2.8**
	95%CI	*3.3–4.6*	*3.7–5.0*	*3.2–5.6*	*2.5–3.1*
5–6 years	mean	3.4	3.8	4.5	2.5
	95%CI	*2.3–4.5*	*2.9–4.8*	*2.4–6.5*	*1.8–3.1*
7–8 years	mean	4.9	4.9	4.6	3.1
	95%CI	*3.9–5.9*	*3.9–5.9*	*3.4–5.7*	*2.5–3.6*
9–10 years	mean	3.6	4.3	4.2	2.9
	95%CI	*2.8–4.4*	*3.4–5.1*	*3.4–4.9*	*2.4–3.4*

Per cent: Per cent of children.
Mean: average number per person.
95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Summary of findings regarding experience of dental caries in the primary dentition

Nearly 50% of Queensland children aged 5–10 years had some level of caries experience in their primary dentition. The average number of decayed, missing, or filled teeth was 2.0, with 0.8 teeth presented as untreated decay and 1 tooth presented as filled (Table 4.13). Age was strongly related to the prevalence of children with caries experience and the number of filled teeth. A markedly higher prevalence of caries experience and number of untreated decayed, filled and dmft score was observed among Indigenous children aged 5–10 years compared to non-Indigenous children. Parental education, household income and reason for last dental visit were strongly associated with all measures of prevalence and severity of dental caries in the primary dentition.

Table 4.13: Summary of caries prevalence and experience in the primary dentition in the Queensland child population

	Population: children aged 5–10 years					
	Untreated decayed		Missing	Filled	dmft	
	% children	Mean number of teeth	% children	Mean number of teeth	% children	Mean number of teeth
Age						
5–6 years	Ref	Ref	Ref	Ref	Ref	Ref
7–8 years			↑	↑	↑↑	
9–10 years		↓		↑	↑↑	
Sex						
Male	Ref	Ref	Ref	Ref	Ref	Ref
Female						
Indigenous identity						
Non-Indigenous	Ref	Ref	Ref	Ref	Ref	Ref
Indigenous	↑↑	↑↑			↑↑	↑↑
Parent country of birth						
Australian born	Ref	Ref	Ref	Ref	Ref	Ref
Overseas born						
Parental education						
School	Ref	Ref	Ref	Ref	Ref	Ref
Vocational training	↓↓	↓↓	↓↓		↓↓	↓↓
Tertiary education	↓↓	↓↓	↓↓		↓↓	↓↓
Household income						
Low	Ref	Ref	Ref	Ref	Ref	Ref
Medium	↓	↓	↓↓		↓	↓
High	↓↓	↓↓	↓↓	↓	↓↓	↓↓
Residential location						
Major city	Ref	Ref	Ref	Ref	Ref	Ref
Inner regional						
Outer regional						
Remote/Very remote						
Reason for last dental visit						
Check-up	Ref	Ref	Ref	Ref	Ref	Ref
Dental problem	↑↑	↑↑	↑↑	↑↑	↑↑	↑↑

Ref=Reference group.
Symbols: ↓↓ Markedly lower; ↓Lower; Not sig. different; ↑ Higher; ↑↑ Markedly higher.

4.1.2 Permanent dentition

The permanent teeth (adult teeth or secondary teeth) start erupting from around the age of 6, and by the age of 13, all primary teeth have been replaced. Permanent caries experience was recorded as the number of untreated Decayed, Missing (due to caries) and Filled (due to caries) permanent teeth (DMFT) or tooth surfaces (DMFS), based on the World Health Organization protocol (WHO 1998; NIDCR 2002). The experience of dental caries in the permanent dentition was calculated for children aged 6–14 years.

Untreated decay

Prevalence of untreated decay in permanent dentition

Children whose examination revealed untreated dental caries in permanent teeth were defined as having untreated decay. Untreated decay reflects both the experience of dental decay and the access to dental care for treatment. The prevalence of untreated decay in the Queensland child population aged 6–14 years was 12.4% (Table 4.14). This percentage increased across age groups with a higher percentage of children aged 9–11 years (13.0%) and 12–14 years (18.6%) having untreated decay than among children aged 6–8 years (5.7%). Among different population groups of children of all ages, Indigenous children had the highest percentage of untreated decay (20.4%), whereas children from high income households had the lowest (7.3%).

Across population groups among children of all ages, untreated decay was more prevalent among children whose parents had only school-level education (16.3%) than children whose parents had some vocational training or some tertiary education. Significant differences were also seen between household income groups. Children from high income households had 2.3 times less untreated decay (7.3%) than children from low income households (16.8%). The percentage of children with untreated decay from high income households was 1.6 times lower than medium income households (10.3%). Children who reported their last dental visit was for a problem had a significantly higher prevalence of untreated decay (17.3%) than those who reported their last dental visit was for a check-up (11%). Of the residential location groups, children from outer regional areas had the lowest prevalence of untreated decay (9.3%) and children from remote/very remote areas had the highest (16.1%). A statistically significant difference was found between outer regional and inner regional children.

The largest differences in the prevalence of untreated decay in the permanent dentition were observed between children from low income households and children from high income households. Children aged 9–11 years and 12–14 years from low income households had significantly higher prevalence of untreated decay than children of the same age from high income households. Indigenous children aged 9–11 years had significantly higher prevalence of untreated decay than non-Indigenous children. Children aged 9–11 years whose last dental visit was for a check-up had significantly lower prevalence of untreated decay (10.7%) than children whose last dental visit was for a problem (19.4%). There were no significant differences found among different populations.

In summary, in the groups of children aged 6–8 years, the prevalence of untreated decay in the permanent dentition was associated with parental education, household income and reason for last dental visit. The differences were more evident among older age groups.

Table 4.14: Percentage of children with untreated decayed permanent teeth in the Queensland child population

	Population: children aged 6–14 years			
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**12.4**	**5.7**	**13.0**	**18.6**
	10.6–14.3	*4.1–7.6*	*10.5–16.0*	*15.3–22.4*
Sex				
Male	12.9	5.8	12.2	21.8
	10.8–15.4	*4.1–8.3*	*9.4–15.5*	*16.9–27.5*
Female	11.7	5.5	14.1	15.6
	9.6–14.1	*3.6–8.1*	*11.2–17.5*	*11.7–20.4*
Indigenous identity				
Non-Indigenous	11.7	5.4	11.8	18.0
	10.0–13.4	*3.9–7.4*	*9.5–14.4*	*14.8–21.7*
Indigenous	20.4	8.3	26.3	27.0
	12.6–31.1	*3.6–18.0*	*17.3–37.8*	*13.6–46.4*
Parent country of birth				
Australian born	11.7	4.7	11.8	18.9
	9.7–14.0	*3.1–6.9*	*9.0–15.4*	*14.8–23.9*
Overseas born	13.3	7.1	14.7	18.2
	10.7–16.4	*4.4–11.1*	*11.4–18.8*	*13.7–23.8*
Parental education				
School	16.3	6.6	19.3	22.8
	13.2–20.0	*4.3–9.8*	*14.8–24.6*	*16.4–30.8*
Vocational training	10.3	4.9	10.3	16.6
	8.0–13.3	*2.7–8.8*	*6.6–15.9*	*12.0–22.6*
Tertiary education	10.5	5.2	10.4	16.5
	8.7–12.6	*3.3–8.3*	*8.1–13.2*	*12.7–21.1*
Household income				
Low	16.8	6.1	16.9	27.0
	13.9–20.1	*4.1–8.8*	*12.5–22.4*	*21.0–33.8*
Medium	10.3	5.0	10.7	15.6
	8.4–12.5	*3.2–7.8*	*8.2–13.8*	*11.8–20.3*
High	7.3	3.4	7.1	11.8
	5.5–9.6	*1.5–7.6*	*4.3–11.4*	*7.6–17.8*
Residential location				
Major city	11.9	6.0	12.6	17.5
	9.6–14.5	*3.8–9.3*	*9.7–16.1*	*13.2–22.8*
Inner regional	15.8	3.9	17.7	25.0
	12.0–20.4	*1.7–8.8*	*11.2–26.9*	*17.1–35.0*
Outer regional	9.3	6.0	8.8	12.8
	7.6–11.2	*3.8–9.2*	*5.8–13.1*	*9.5–17.1*
Remote/Very remote	16.1	7.3	17.0	27.3
	8.1–29.3	*2.9–16.8*	*8.6–30.9*	*13.5–47.5*
Reason for last dental visit				
Check-up	11.0	4.2	10.7	17.3
	9.3–12.9	*2.8–6.1*	*8.2–13.8*	*14.0–21.0*
Dental problem	17.3	8.8	19.4	24.3
	13.9–21.4	*5.3–14.1*	*14.6–25.1*	*17.6–32.6*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Number of untreated decayed permanent teeth

The number of untreated decayed permanent teeth is shown in Table 4.15. Decay was assessed as being present if the tooth was cavitated or the enamel was undermined due to caries. Untreated decay reflects both caries rates and access to dental care. The number of permanent teeth affected by decay in the Queensland child population was 0.2. This number was lower among children aged 6–8 years (0.1 teeth) and higher among children aged 9–11 years (0.2 teeth) and in children aged 12–14 years (0.4 teeth).

Children whose parents had only school-level education had higher numbers of decayed teeth (0.4 teeth) relative to children whose parents had a vocational (0.1 teeth) or tertiary education (0.2 teeth). Among children aged 9–11 years, children whose parents had only school-level education had three times the number of untreated teeth as children of tertiary educated parents (0.3 compared with 0.1 teeth).

The average number of untreated decayed teeth was associated with household income with children from low income households having three times the number of decayed teeth (0.3 teeth) relative to children from high income households (0.1 teeth). This pattern was seen among children aged 9–11 years where there was a 3-fold relative difference (0.3 compared with 0.1 teeth) and children aged 12–14 years with a 3-fold relative difference (0.6 compared with 0.2 teeth).

Some difference was seen between children who attended for a dental problem at their last dental visit and those who visited for a check-up, with 1.5 times the number of untreated decayed teeth seen among those who last visited for a problem among all children, and 1.5 times the number in children aged 9–11 years and a 2-fold relative difference in children aged 12–14 years.

In summary, the number of untreated decayed permanent teeth was associated with age group, parental education, household income and reason for last dental visit.

Table 4.15: Number of untreated decayed permanent teeth in the Queensland child population

		Population: children aged 6–14 years		
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**0.2**	**0.1**	**0.2**	**0.4**
	0.2–0.3	*0.1–0.1*	*0.1–0.3*	*0.3–0.5*
Male	0.2	0.1	0.2	0.4
	0.2–0.3	*0.1–0.1*	*0.1–0.2*	*0.3–0.6*
Female	0.2	0.1	0.2	0.3
	0.2–0.3	*0.0–0.1*	*0.2–0.3*	*0.2–0.5*
Indigenous identity				
Non-Indigenous	0.2	0.1	0.2	0.4
	0.2–0.2	*0.1–0.1*	*0.1–0.2*	*0.3–0.4*
Indigenous	0.5	0.1	0.6	0.8
	0.1–0.9	*0.0–0.3*	*0.1–1.1*	*0.2–1.4*
Parent country of birth				
Australian born	0.2	0.1	0.2	0.4
	0.2–0.3	*0.0–0.1*	*0.1–0.2*	*0.3–0.5*
Overseas born	0.2	0.1	0.2	0.4
	0.2–0.3	*0.1–0.1*	*0.2–0.3*	*0.3–0.5*
Parental education				
School	0.4	0.1	0.3	0.6
	0.3–0.5	*0.1–0.2*	*0.2–0.4*	*0.4–0.8*
Vocational training	0.1	0.1	0.1	0.3
	0.1–0.2	*0.0–0.1*	*0.1–0.2*	*0.1–0.4*
Tertiary education	0.2	0.1	0.1	0.3
	0.1–0.2	*0.0–0.1*	*0.1–0.2*	*0.2–0.4*
Household income				
Low	0.3	0.1	0.3	0.6
	0.2–0.4	*0.1–0.1*	*0.2–0.3*	*0.4–0.7*
Medium	0.2	0.1	0.2	0.3
	0.1–0.2	*0.0–0.1*	*0.1–0.2*	*0.2–0.4*
High	0.1	0.0	0.1	0.2
	0.1–0.1	*0.0–0.1*	*0.0–0.1*	*0.1–0.2*
Residential location				
Major city	0.2	0.1	0.2	0.3
	0.1–0.2	*0.0–0.1*	*0.1–0.2*	*0.2–0.5*
Inner regional	0.3	0.1	0.2	0.5
	0.2–0.4	*0.0–0.1*	*0.1–0.3*	*0.3–0.8*
Outer regional	0.2	0.1	0.1	0.2
	0.1–0.2	*0.1–0.1*	*0.1–0.2*	*0.1–0.3*
Remote/Very remote	0.4	0.1	0.5	0.7
	0.0–0.8	*0.0–0.2*	*0.1–1.0*	*0.1–1.3*
Reason for last dental visit				
Check-up	0.2	0.1	0.2	0.3
	0.1–0.2	*0.0–0.1*	*0.1–0.2*	*0.2–0.4*
Dental problem	0.3	0.1	0.3	0.6
	0.2–0.4	*0.1–0.2*	*0.2–0.4*	*0.4–0.9*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Number of untreated decayed permanent tooth surfaces

The number of untreated decayed permanent tooth surfaces is shown in Table 4.16. The number of permanent tooth surfaces affected by decay in the Queensland child population was 0.3 surfaces. This number was lower among children aged 6–8 years (0.1 surfaces) and higher among children aged 9–11 years (0.3 surfaces) and 12–14 years (0.5 surfaces).

Children whose parents' education was only school-level had higher numbers of decayed tooth surfaces (0.5 surfaces) relative to children whose parents had a vocational or tertiary education (0.2 surfaces). The relative difference between the groups was 2.5-fold. Among children aged 9–11 years, children whose parents had only school-level education had twice the number of untreated decayed tooth surfaces as children of tertiary educated parents (0.4 compared with 0.2 surfaces). There was a 2.7-fold difference between children aged 12–14 years where the highest parental education was school-level (0.8 surfaces) compared with children of vocationally or tertiary educated parents (0.3 surfaces).

The number of untreated decayed tooth surfaces was associated with household income with children from low income households (0.4 surfaces) having four times the number of decayed surfaces relative to children from high income households (0.1 surfaces). This pattern was also seen among children aged 9–11 years where there was a 3.0-fold relative difference (0.3 compared with 0.1 surfaces) and in children aged 12–14 years with a 3.5-fold difference (0.7 compared with 0.2 surfaces).

In summary, the number of untreated decayed permanent tooth surfaces was associated with age group, parental education and household income.

Table 4.16: Number of untreated decayed permanent tooth surfaces in the Queensland child population

		Population: children aged 6–14 years		
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**0.3**	**0.1**	**0.3**	**0.5**
	0.2–0.4	*0.1–0.1*	*0.2–0.4*	*0.3–0.6*
Sex				
Male	0.3	0.1	0.2	0.5
	0.2–0.3	*0.1–0.1*	*0.1–0.3*	*0.3–0.7*
Female	0.3	0.1	0.3	0.4
	0.2–0.4	*0.1–0.1*	*0.2–0.5*	*0.3–0.6*
Indigenous identity				
Non-Indigenous	0.2	0.1	0.2	0.4
	0.2–0.3	*0.1–0.1*	*0.2–0.3*	*0.3–0.5*
Indigenous	0.7	0.2	1.0	1.1
	0.1–1.4	*0.0–0.3*	*0.1–1.9*	*0.1–2.1*
Parent country of birth				
Australian born	0.3	0.1	0.2	0.5
	0.2–0.3	*0.1–0.1*	*0.1–0.3*	*0.3–0.6*
Overseas born	0.3	0.1	0.3	0.5
	0.2–0.4	*0.1–0.2*	*0.2–0.5*	*0.3–0.7*
Parental education				
School	0.5	0.1	0.4	0.8
	0.3–0.6	*0.1–0.2*	*0.3–0.6*	*0.5–1.1*
Vocational training	0.2	0.1	0.2	0.3
	0.1–0.2	*0.0–0.1*	*0.1–0.3*	*0.2–0.4*
Tertiary education	0.2	0.1	0.2	0.3
	0.1–0.2	*0.0–0.1*	*0.1–0.2*	*0.2–0.4*
Household income				
Low	0.4	0.1	0.3	0.7
	0.3–0.5	*0.1–0.2*	*0.2–0.5*	*0.5–0.9*
Medium	0.2	0.1	0.2	0.4
	0.2–0.3	*0.0–0.1*	*0.1–0.3*	*0.2–0.6*
High	0.1	0.1	0.1	0.2
	0.1–0.1	*0.0–0.1*	*0.0–0.1*	*0.1–0.3*
Residential location				
Major city	0.2	0.1	0.2	0.4
	0.2–0.3	*0.0–0.1*	*0.2–0.3*	*0.2–0.5*
Inner regional	0.4	0.1	0.3	0.7
	0.2–0.5	*0.0–0.1*	*0.1–0.5*	*0.4–1.0*
Outer regional	0.2	0.1	0.2	0.3
	0.1–0.2	*0.1–0.1*	*0.1–0.2*	*0.2–0.4*
Remote/Very remote	0.6	0.2	0.8	1.1
	0.0–1.3	*0.0–0.3*	*0.2–1.7*	*0.1–2.1*
Reason for last dental visit				
Check-up	0.2	0.1	0.2	0.4
	0.2–0.3	*0.0–0.1*	*0.1–0.3*	*0.3–0.5*
Dental problem	0.4	0.1	0.4	0.8
	0.3–0.6	*0.1–0.2*	*0.3–0.6*	*0.5–1.1*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Prevalence of permanent tooth loss due to caries

The percentage of children with tooth loss (missing teeth) due to caries in permanent teeth among children aged 6–14 years was under 1% as shown in Table 4.17. The highest percentage of tooth loss was found in children whose parents were born overseas (1.4%).

There were no statistically significant differences in the prevalence of tooth loss among different population groups. Confidence intervals were wide because of the small number of children with tooth loss in their permanent dentition.

Table 4.17: Percentage of children with missing teeth due to caries in the permanent dentition in the Queensland child population

		Population: children aged 6–14 years		
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**0.8**	**0.5**	**0.6**	**1.3**
	0.4–1.3	*0.2–1.3*	*0.3–1.4*	*0.6–2.7*
Sex				
Male	0.8	0.0	0.6	1.9
	0.4–1.8	*0.0–0.1*	*0.2–1.9*	*0.7–5.1*
Female	0.8	1.0	0.6	0.6
	0.4–1.3	*0.3–2.8*	*0.3–1.5*	*0.2–1.8*
Indigenous identity				
Non-Indigenous	0.8	0.5	0.6	1.3
	0.4–1.4	*0.2–1.4*	*0.3–1.4*	*0.5–2.9*
Indigenous	0.7	0.1	1.0	1.0
	0.1–3.3	*0.0–0.7*	*0.2–5.4*	*0.2–5.4*
Parent country of birth				
Australian born	0.4	0.0	0.6	0.5
	0.2–0.8	*0.0–0.1*	*0.2–1.8*	*0.2–1.5*
Overseas born	1.4	1.1	0.8	2.3
	0.7–2.7	*0.4–3.2*	*0.3–2.3*	*0.8–6.1*
Parental education				
School	1.1	0.7	0.9	1.6
	0.4–2.8	*0.1–3.9*	*0.3–2.8*	*0.4–6.1*
Vocational training	0.7	0.7	0.6	0.8
	0.2–2.4	*0.1–4.5*	*0.1–2.5*	*0.2–4.5*
Tertiary education	0.7	0.3	0.6	1.3
	0.3–1.5	*0.1–1.6*	*0.2–1.9*	*0.4–4.1*
Household income				
Low	1.0	0.6	1.2	1.3
	0.4–2.4	*0.1–3.4*	*0.4–3.0*	*0.3–5.5*
Medium	0.6	0.3	0.5	1.0
	0.3–1.3	*0.1–1.9*	*0.1–2.6*	*0.3–3.0*
High	1.0	0.8	0.2	2.2
	0.3–3.3	*0.1–4.3*	*0.0–1.2*	*0.5–10.0*
Residential location				
Major city	1.0	0.6	0.7	1.9
	0.5–2.2	*0.1–2.3*	*0.2–2.2*	*0.7–5.3*
Inner regional	0.4	0.7	0.4	0.0
	0.1–2.4	*0.1–4.8*	*0.1–2.5*	—
Outer regional	0.4	0.2	0.5	0.6
	0.2–0.9	*0.1–0.4*	*0.1–1.5*	*0.1–2.1*
Remote/Very remote	1.2	0.1	1.0	3.0
	0.4–3.7	*0.0–0.6*	*0.2–5.8*	*1.0–9.0*
Reason for last dental visit				
Check-up	0.7	0.4	0.7	0.9
	0.3–1.4	*0.1–1.5*	*0.3–1.6*	*0.3–3.0*
Dental problem	1.3	1.0	0.5	2.7
	0.6–2.6	*0.2–4.9*	*0.1–2.1*	*1.0–7.0*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Number of filled teeth due to caries in the permanent dentition

The number of teeth in the permanent dentition that are filled because of caries is shown in Table 4.18. These filled teeth have been distinguished from teeth filled for other reasons such as trauma. The average number of filled teeth in all children was 0.5 teeth, with fewer teeth filled among younger children (0.1 teeth in children aged 6–8 years) and more among children aged 12–14 years (1.0 teeth). This increase occurs because older children have more permanent teeth and because the teeth have been present in the mouth for longer.

For all children, the highest number of permanent filled teeth due to caries was observed in children whose last dental visit was for a dental problem. Children who made their last dental visit because of a problem had 2.0 times more filled teeth than children who visited for a check-up (0.8 compared with 0.4 teeth). There was a 1.8-fold difference in the number of filled teeth between children whose parents completed their education at school-level (0.7 teeth) and those whose parents had a tertiary education (0.4 teeth).

Across age groups, there was a marked increase in the number of filled teeth due to dental caries. A 1.8-fold relative difference was seen in children aged 9–11 years (0.7 compared with 0.4 teeth) and a 2.0-fold relative difference in children aged 12–14 years (1.6 compared with 0.8 teeth).

In summary, significant differences in the average number of filled teeth was seen by children's age, parental education and reason for last dental visit.

Table 4.18: Number of filled teeth due to caries in the permanent dentition per child in the Queensland child population

	Population: children aged 6–14 years			
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**0.5**	**0.1**	**0.5**	**1.0**
	0.4–0.6	*0.1–0.1*	*0.4–0.5*	*0.8–1.1*
Sex				
Male	0.4	0.1	0.4	0.9
	0.4–0.5	*0.0–0.1*	*0.3–0.5*	*0.7–1.0*
Female	0.6	0.1	0.5	1.0
	0.5–0.6	*0.1–0.2*	*0.4–0.6*	*0.9–1.2*
Indigenous identity				
Non-Indigenous	0.5	0.1	0.4	1.0
	0.4–0.6	*0.1–0.1*	*0.4–0.5*	*0.8–1.1*
Indigenous	0.5	0.1	0.5	0.9
	0.4–0.6	*0.0–0.2*	*0.3–0.8*	*0.6–1.3*
Parent country of birth				
Australian born	0.5	0.1	0.4	1.0
	0.4–0.6	*0.1–0.2*	*0.4–0.5*	*0.8–1.2*
Overseas born	0.5	0.1	0.5	0.9
	0.4–0.6	*0.0–0.1*	*0.4–0.6*	*0.7–1.1*
Parental education				
School	0.7	0.1	0.6	1.2
	0.5–0.8	*0.1–0.2*	*0.5–0.7*	*0.9–1.5*
Vocational training	0.5	0.1	0.4	1.1
	0.4–0.6	*0.0–0.2*	*0.3–0.5*	*0.8–1.4*
Tertiary education	0.4	0.1	0.4	0.7
	0.3–0.5	*0.0–0.1*	*0.3–0.5*	*0.6–0.9*
Household income				
Low	0.6	0.2	0.6	1.1
	0.5–0.7	*0.1–0.2*	*0.5–0.7*	*0.9–1.4*
Medium	0.4	0.1	0.4	0.9
	0.4–0.5	*0.0–0.1*	*0.3–0.5*	*0.7–1.1*
High	0.4	0.1	0.3	0.8
	0.3–0.5	*0.0–0.1*	*0.2–0.5*	*0.5–1.0*
Residential location				
Major city	0.5	0.1	0.4	1.0
	0.4–0.6	*0.1–0.2*	*0.3–0.5*	*0.8–1.2*
Inner regional	0.5	0.1	0.6	0.9
	0.4–0.7	*0.0–0.1*	*0.4–0.7*	*0.7–1.2*
Outer regional	0.5	0.1	0.4	0.9
	0.4–0.6	*0.0–0.1*	*0.3–0.6*	*0.7–1.2*
Remote/Very remote	0.5	0.2	0.5	1.0
	0.4–0.6	*0.0–0.4*	*0.3–0.6*	*0.5–1.5*
Reason for last dental visit				
Check-up	0.4	0.1	0.4	0.8
	0.4–0.5	*0.0–0.1*	*0.3–0.4*	*0.7–1.0*
Dental problem	0.8	0.2	0.7	1.6
	0.7–0.9	*0.1–0.3*	*0.5–0.8*	*1.3–1.9*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Number of permanent filled tooth surfaces due to caries

The number of tooth surfaces filled because of caries in the permanent dentition is shown in Table 4.19. These have been presented separately from tooth surfaces filled for other reasons such as trauma. The average number of filled surfaces in all children was 0.7 surfaces, with fewer surfaces filled among younger children (0.1 surfaces in children aged 6–8 years) and more among children aged 9–11 years (0.6 surfaces) and more again among children aged 12–14 years (1.3 surfaces). This increase occurs because older children have more permanent teeth and thus tooth surfaces, and because the tooth surfaces have been present in the mouth for longer.

There was a difference in the number of filled surfaces between children whose parents completed their education at school (0.9 surfaces) and those whose parents had a tertiary education (0.6 surfaces).

For all children there was a 1.5-fold difference in the number of filled surfaces between children from low income households (0.9 surfaces) and those from high income households (0.6 surfaces). A similar relative difference (1.6-fold) was seen between low and high household income children among those aged 9–11 years (0.8 versus 0.5 surfaces).

Children who made their last dental visit for a problem had 1.8 times more filled surfaces than children who last visited for a check-up (1.1 versus 0.6 surfaces). This difference was seen among all age groups with a 3.0-fold relative difference in children aged 6–8 years (0.3 versus 0.1 surfaces), a 2.0-fold difference in children aged 9–11 years (1.0 versus 0.5 surfaces) and a 2.0-fold relative difference in children aged 12–14 years (2.2 versus 1.1 surfaces).

In summary, significant differences in the average number of filled tooth surfaces were associated with age and reason for last dental visit.

Table 4.19: Number of filled surfaces due to caries in the permanent dentition per child in the Queensland child population

		Population: children aged 6–14 years		
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**0.7**	**0.1**	**0.6**	**1.3**
	0.6–0.8	*0.1–0.2*	*0.5–0.7*	*1.2–1.5*
Sex				
Male	0.6	0.1	0.6	1.3
	0.5–0.7	*0.1–0.2*	*0.5–0.7*	*1.0–1.5*
Female	0.8	0.1	0.7	1.4
	0.6–0.9	*0.1–0.2*	*0.5–0.8*	*1.2–1.7*
Indigenous identity				
Non-Indigenous	0.7	0.1	0.6	1.3
	0.6–0.8	*0.1–0.2*	*0.5–0.7*	*1.2–1.5*
Indigenous	0.7	0.1	0.7	1.4
	0.5–0.9	*0.0–0.3*	*0.4–1.1*	*0.9–2.0*
Parent country of birth				
Australian born	0.7	0.2	0.6	1.4
	0.6–0.8	*0.1–0.2*	*0.5–0.7*	*1.1–1.6*
Overseas born	0.7	0.1	0.7	1.3
	0.6–0.8	*0.0–0.1*	*0.5–0.8*	*1.0–1.6*
Parental education				
School	0.9	0.2	0.8	1.6
	0.7–1.1	*0.1–0.3*	*0.6–1.1*	*1.3–2.0*
Vocational training	0.7	0.1	0.5	1.5
	0.5–0.8	*0.0–0.2*	*0.4–0.7*	*1.1–1.9*
Tertiary education	0.6	0.1	0.5	1.1
	0.5–0.7	*0.0–0.2*	*0.4–0.6*	*0.9–1.3*
Household income				
Low	0.9	0.2	0.8	1.6
	0.7–1.0	*0.1–0.3*	*0.6–1.0*	*1.2–1.9*
Medium	0.6	0.1	0.5	1.2
	0.5–0.7	*0.1–0.1*	*0.4–0.6*	*1.0–1.5*
High	0.6	0.1	0.5	1.2
	0.4–0.7	*0.0–0.2*	*0.3–0.6*	*0.8–1.6*
Residential location				
Major city	0.7	0.1	0.6	1.4
	0.6–0.8	*0.1–0.2*	*0.4–0.7*	*1.1–1.7*
Inner regional	0.7	0.1	0.8	1.3
	0.5–0.9	*0.0–0.1*	*0.6–1.0*	*0.9–1.7*
Outer regional	0.7	0.1	0.6	1.3
	0.5–0.9	*0.1–0.1*	*0.4–0.8*	*0.9–1.6*
Remote/Very remote	0.7	0.3	0.6	1.4
	0.5–0.9	*0.0–0.6*	*0.4–0.8*	*0.8–2.0*
Reason for last dental visit				
Check-up	0.6	0.1	0.5	1.1
	0.5–0.7	*0.1–0.1*	*0.4–0.6*	*1.0–1.3*
Dental problem	1.1	0.3	1.0	2.2
	0.9–1.3	*0.2–0.4*	*0.8–1.3*	*1.8–2.7*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Total caries experience in the permanent dentition (DMFT)

Prevalence of caries

Children, whose Survey examination revealed having at least one tooth with untreated decay, missing or filled due to caries in the permanent dentition, were classified as having caries in the permanent teeth. Such children had a DMFT index greater than 0 (DMFT>0).

Over one in four Queensland children (29.5%) had caries (Table 4.20). This percentage was much higher among children aged 12–14 years, where almost half had experienced caries (46.4%). This percentage was 4.1 times that of children aged 6–8 years (11.2%) and 1.5 times that of children aged 9–11 years (31.5%).

Among different population groups of children of all ages, children whose last dental visit was for a dental problem had highest prevalence of caries (42.1%), and this prevalence was 1.6 times higher than that among children whose last dental visit was for a check-up (26.9%). Other differences seen were related to parental education and household income. Caries in the permanent dentition was 1.4 times more prevalent among children whose parents had only school-level education (36.3%) and among children from low income households (34.8%) than children whose parents had a tertiary education (26.4%) and children from high income households (23.7%). Indigenous children were 1.3 times more likely to have caries in their permanent teeth than non-Indigenous children.

There were no significant differences among groups by sex, parents' country of birth or residential location.

The largest differences were observed among children aged 5–6 years with a 2.4-fold difference in the prevalence of caries between children whose last dental visit was for a problem (20.5%) and those whose last visit was for a check-up (8.5%). Among children aged 9–11 years, the difference between Indigenous and non-Indigenous caries prevalence was significant. The relative difference was 1.7 times higher among Indigenous children (50.0%) than non-Indigenous children (29.2%). Among children aged 9–11 years and 12–14 years, the caries prevalence was significantly higher in children whose parents had only school-level education (40.1% and 54.1%, respectively) than children whose parents had a tertiary education (29.2% and 41.0%). Children from low income households had a much higher prevalence of caries than children from medium or high income households in all different age groups but only showed a statistical significance among children aged 9–11 years.

In summary, children from disadvantage backgrounds including Indigenous identity, whose parents had less education or who were from low income households, had a higher prevalence of caries in their permanent dentition.

Table 4.20: Percentage of children with caries in the permanent dentition in the Queensland child population

	Population: children aged 6–14 years			
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**29.5**	**11.2**	**31.6**	**46.4**
	27.2–31.8	*9.3–13.5*	*28.8–34.4*	*42.8–50.0*
Sex				
Male	28.7	10.4	30.3	47.3
	26.0–31.6	*8.1–13.3*	*26.6–34.2*	*42.2–52.4*
Female	30.3	12.1	33.0	45.6
	27.3–33.5	*9.4–15.5*	*29.1–37.2*	*40.4–50.9*
Indigenous identity				
Non-Indigenous	28.7	11.1	29.8	45.9
	26.5–31.1	*9.1–13.4*	*27.1–32.5*	*42.2–49.6*
Indigenous	38.2	12.7	50.0	53.2
	31.3–45.5	*7.1–21.8*	*40.0–59.9*	*39.5–66.3*
Parent country of birth				
Australian born	28.9	10.8	29.2	47.8
	26.2–31.7	*8.4–13.6*	*25.6–33.1*	*43.3–52.3*
Overseas born	30.4	11.9	34.8	44.5
	27.2–33.7	*8.6–16.1*	*30.9–38.9*	*38.9–50.1*
Parental education				
School	36.3	13.3	40.1	54.1
	32.3–40.3	*9.7–17.9*	*34.4–46.0*	*47.6–60.4*
Vocational training	27.4	10.9	26.4	47.7
	23.9–31.1	*7.3–15.9*	*21.0–32.6*	*40.7–54.7*
Tertiary education	26.4	10.3	29.2	41.0
	24.0–29.0	*7.7–13.8*	*26.1–32.3*	*35.9–46.1*
Household income				
Low	34.8	12.9	38.0	52.1
	31.4–38.2	*9.7–16.9*	*33.0–43.2*	*46.0–58.2*
Medium	27.1	9.6	28.1	45.2
	24.2–30.3	*7.2–12.7*	*24.2–32.4*	*39.9–50.5*
High	23.7	9.9	24.4	38.0
	20.2–27.4	*6.2–15.4*	*19.5–30.0*	*29.9–46.8*
Residential location				
Major city	29.1	11.9	29.5	47.4
	25.9–32.5	*9.2–15.3*	*25.9–33.5*	*41.5–53.4*
Inner regional	30.9	8.6	39.0	44.4
	26.9–35.2	*5.5–13.2*	*32.7–45.6*	*36.8–52.2*
Outer regional	28.2	9.5	28.8	45.1
	24.1–32.7	*7.4–12.2*	*22.6–35.8*	*39.4–51.0*
Remote/Very remote	32.8	17.6	34.3	52.4
	24.8–41.9	*9.3–30.9*	*24.0–46.3*	*38.6–65.8*
Reason for last dental visit				
Check-up	26.9	8.5	26.6	43.2
	24.5–29.3	*6.8–10.7*	*23.6–29.8*	*39.2–47.3*
Dental problem	42.1	20.5	46.0	61.2
	37.7–46.4	*15.4–26.9*	*40.2–52.0*	*53.9–68.0*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Number of decayed, missing and filled permanent teeth per child (DMFT)

The number of decayed, missing and filled permanent teeth (DMFT) is a common measure of total caries experience where the number of teeth with untreated decay, missing teeth due to caries and filled teeth due to caries are summed. Among children aged 6–14 years the number of teeth with caries experience was 0.7 teeth. This number increased across the age groups being 0.2 teeth for children aged 6–8 years, 0.7 teeth for those aged 9–11 years and 1.4 teeth for children aged 12–14 years (Table 4.21).

The highest number of teeth with decay experience was seen in those children who last visited a dental clinic because of a problem (1.1 teeth) and the lowest was among children from high income households (0.5 teeth).

Children whose parents had only school-level education had 1.7 times more caries experience than children whose parents had a tertiary education (1.0 compared with 0.6 teeth). Similar relative differences were seen among children aged 9–11 years where the difference was 1.5-fold and among those aged 12–14 years where the difference was 1.8-fold.

Household income was associated with differences in caries experience among all children, with low income children (1.0 teeth) having 1.7 to 2.0 times the caries experience than children from medium (0.6 teeth) or high income households (0.5 teeth). Among children aged 9–11 years the relative difference was 2.0-fold between children from low income households (0.8 teeth) and those from high income households (0.4 teeth). In the 12–14 year age group, the relative difference was 1.7-fold between children from low income households (1.7 teeth) and those from high income households (1.0 teeth).

Sizeable differences were seen between children who last visited a dental clinic for a dental problem and for a check-up. Among children aged 6–14 years there was a 1.8-fold relative difference in number of teeth with caries experience between children who last visited for a dental problem (1.1 teeth) and for a check-up (0.6 teeth). Children aged 9–11 years who last visited for a problem had 1.7 times the caries experience of those who went for a check-up (1.0 compared with 0.6 teeth), and among those aged 12–14 years there was a relative difference of 1.8-fold between those who last visited for a dental problem (2.2 teeth) and a check-up (1.2 teeth).

In summary, older children had on average more teeth affected by caries experience in the permanent dentition. The relative differences between population groups were more marked among children aged 9–11 and 12–14 years than among younger children. Differences were seen in relation to parental education, household income and reason for last dental visit.

Table 4.21: Number of decayed, missing and filled teeth per child in the permanent dentition in the Queensland child population

	Population: children aged 6–14 years			
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**0.7**	**0.2**	**0.7**	**1.4**
	0.6–0.8	*0.1–0.2*	*0.6–0.8*	*1.2–1.5*
Sex				
Male	0.7	0.2	0.6	1.3
	0.6–0.8	*0.1–0.2*	*0.5–0.7*	*1.1–1.5*
Female	0.8	0.2	0.8	1.4
	0.7–0.9	*0.1–0.3*	*0.6–0.9*	*1.1–1.7*
Indigenous identity				
Non-Indigenous	0.7	0.2	0.6	1.3
	0.6–0.8	*0.1–0.2*	*0.5–0.7*	*1.2–1.5*
Indigenous	1.0	0.3	1.2	1.7
	0.6–1.4	*0.1–0.4*	*0.7–1.7*	*0.9–2.6*
Parent country of birth				
Australian born	0.7	0.2	0.6	1.4
	0.6–0.8	*0.1–0.2*	*0.5–0.7*	*1.2–1.6*
Overseas born	0.7	0.2	0.7	1.3
	0.6–0.9	*0.1–0.2*	*0.6–0.9*	*1.1–1.5*
Parental education				
School	1.0	0.3	0.9	1.8
	0.9–1.2	*0.2–0.4*	*0.7–1.1*	*1.5–2.2*
Vocational training	0.7	0.2	0.6	1.4
	0.5–0.8	*0.1–0.3*	*0.4–0.7*	*1.0–1.7*
Tertiary education	0.6	0.2	0.6	1.0
	0.5–0.6	*0.1–0.2*	*0.5–0.6*	*0.8–1.2*
Household Income				
Low	1.0	0.3	0.8	1.7
	0.8–1.1	*0.2–0.3*	*0.7–1.0*	*1.4–2.1*
Medium	0.6	0.1	0.6	1.2
	0.5–0.7	*0.1–0.2*	*0.5–0.7*	*1.0–1.4*
High	0.5	0.1	0.4	1.0
	0.4–0.6	*0.1–0.2*	*0.3–0.5*	*0.7–1.2*
Residential location				
Major city	0.7	0.2	0.6	1.4
	0.6–0.8	*0.1–0.3*	*0.5–0.7*	*1.1–1.6*
Inner regional	0.8	0.1	0.8	1.5
	0.6–1.0	*0.1–0.2*	*0.6–0.9*	*1.1–1.8*
Outer regional	0.6	0.2	0.6	1.2
	0.5–0.8	*0.1–0.2*	*0.4–0.7*	*0.9–1.4*
Remote/Very remote	0.9	0.3	1.0	1.8
	0.5–1.4	*0.1–0.5*	*0.4–1.6*	*0.8–2.7*
Reason for last dental visit				
Check-up	0.6	0.1	0.6	1.2
	0.5–0.7	*0.1–0.2*	*0.5–0.7*	*1.0–1.3*
Dental problem	1.1	0.4	1.0	2.2
	1.0–1.3	*0.3–0.5*	*0.8–1.2*	*1.8–2.6*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Number of decayed, missing and filled permanent tooth surfaces per child (DMFS)

The number of decayed, missing and filled permanent tooth surfaces measures total caries experience where the number of tooth surfaces with untreated decay, the number of tooth surfaces missing due to caries and the number of tooth surfaces with fillings placed to treat caries are summed. Among children aged 6–14 years the average number of tooth surfaces with caries experience was 1.0 surface. This number increased across age groups being 0.2 surfaces for children aged 6–8 years, 0.9 surfaces for those aged 9–11 years and 1.9 surfaces for children aged 12–14 years (Table 4.22).

The highest number of tooth surfaces with caries experience in all children was seen in those who last visited a dental clinic for a problem (1.6 surfaces) and the lowest was among children who lived in high income households (0.7 surfaces).

Children with parents whose highest level of education was school had 1.8 times more caries experience than children whose parents had a tertiary education (1.4 compared with 0.8 surfaces). Similar relative differences were seen among children aged 9–11 years where the relative difference was 1.9-fold and among those aged 12–14 years where the difference was 1.7-fold.

Household income was associated with differences in caries experience among all children, with low income children (1.3 surfaces) having 1.9 times the caries experience of high income children (0.7 surfaces). Among children aged 9–11 years the relative difference was 2.4-fold between children from low income households (1.2 surfaces) and those from high income households (0.5 surfaces). In the 12–14 years age group the relative difference was 1.6-fold between children from low income households (2.3 surfaces) and those from high income households (1.4 surfaces).

Sizeable differences were seen in the number of tooth surfaces with caries experience between children who last visited a dental clinic for a dental problem and those who visited for a check-up. Among children aged 6–14 years there was a 1.8-fold relative difference in the numbers of surfaces with caries experience between children who visited for a dental problem (1.6) and those who visited for a check-up (0.9 surfaces). Among children aged 9–11 years those who last visited for a problem had 2.1 times the caries experience of those who went for a check-up (1.5 compared with 0.7 surfaces), and among those aged 12–14 years there was a relative difference of 1.9-fold between those who last visited for a dental problem (3.1 surfaces) and those who visited for a check-up (1.6 surfaces).

In summary, older children had more permanent tooth surfaces affected by caries experience. The relative differences between population groups were more marked among those aged 9–11 and 12–14 years than among younger children. Relative differences were seen in relation to parental education, household income and reason for last dental visit.

Table 4.22: Number of decayed missing and filled tooth surfaces per child in the permanent dentition in the Queensland child population

		Population: children aged 6–14 years		
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**1.0**	**0.2**	**0.9**	**1.9**
	0.9–1.1	*0.2–0.3*	*0.8–1.1*	*1.6–2.1*
Sex				
Male	0.9	0.2	0.8	1.8
	0.8–1.1	*0.2–0.3*	*0.7–1.0*	*1.5–2.1*
Female	1.1	0.3	1.0	1.9
	0.9–1.3	*0.2–0.4*	*0.8–1.2*	*1.5–2.3*
Indigenous identity				
Non-Indigenous	1.0	0.2	0.8	1.8
	0.8–1.1	*0.2–0.3*	*0.7–1.0*	*1.6–2.0*
Indigenous	1.5	0.3	1.8	2.6
	0.8–2.2	*0.1–0.5*	*0.8–2.8*	*1.2–3.9*
Parent country of birth				
Australian born	1.0	0.2	0.8	1.9
	0.8–1.1	*0.2–0.3*	*0.7–1.0*	*1.6–2.2*
Overseas born	1.0	0.2	1.0	1.9
	0.9–1.2	*0.2–0.3*	*0.8–1.2*	*1.5–2.2*
Parental education				
School	1.4	0.4	1.3	2.5
	1.1–1.7	*0.2–0.5*	*1.0–1.6*	*1.9–3.0*
Vocational training	0.9	0.2	0.8	1.8
	0.7–1.1	*0.1–0.4*	*0.6–0.9*	*1.4–2.2*
Tertiary education	0.8	0.2	0.7	1.5
	0.7–0.9	*0.1–0.3*	*0.6–0.9*	*1.2–1.7*
Household income				
Low	1.3	0.3	1.2	2.3
	1.1–1.5	*0.2–0.5*	*0.9–1.4*	*1.9–2.8*
Medium	0.8	0.2	0.8	1.6
	0.7–1.0	*0.1–0.2*	*0.6–0.9*	*1.3–2.0*
High	0.7	0.2	0.5	1.4
	0.5–0.9	*0.1–0.3*	*0.4–0.7*	*1.0–1.9*
Residential location				
Major city	1.0	0.2	0.8	1.9
	0.8–1.1	*0.2–0.3*	*0.7–1.0*	*1.5–2.2*
Inner regional	1.1	0.2	1.1	2.0
	0.8–1.4	*0.1–0.3*	*0.9–1.3*	*1.4–2.5*
Outer regional	0.9	0.2	0.8	1.6
	0.7–1.0	*0.1–0.3*	*0.6–1.0*	*1.3–1.9*
Remote/Very remote	1.3	0.4	1.4	2.6
	0.6–2.1	*0.1–0.7*	*0.4–2.5*	*1.1–4.0*
Reason for last dental visit				
Check-up	0.9	0.2	0.7	1.6
	0.7–1.0	*0.1–0.2*	*0.6–0.9*	*1.3–1.8*
Dental problem	1.6	0.4	1.5	3.1
	1.3–1.9	*0.3–0.6*	*1.2–1.8*	*2.5–3.7*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated means.
Columns are arranged by age at time of Survey.

Prevalence of non-cavitated lesions

Non-cavitated (incipient) lesions are the first sign of the caries process in enamel. The initial enamel lesion results from an imbalance between demineralisation and remineralisation at the tooth surface. The detection of carious lesions at their earliest stage can potentially assist in reversing or arresting the caries process and in determining future risk. Table 4.23 reports experience of non-cavitated enamel lesions in the permanent dentition as a proportion of children with the condition observed on at least one tooth surface. Such lesions are not included in the number of untreated decayed tooth or tooth surfaces, and consequently are not included in the DMFT or DMFS count.

Nearly one-fifth (18.1%) of children aged 6–14 years had at least one non-cavitated lesion (Table 3.1). This percentage sharply increased across age groups with the highest percentage among children aged 12–14 years (28.7%).

Among different population groups of children of all ages, Indigenous children had the highest prevalence of non-cavitated lesions (26.7%) while the lowest level of non-cavitated lesions was found in children from high income households (12.9%). Other differences observed related to parental education, reason for last dental visit and residential location.

Among children of all ages the prevalence of non-cavitated lesions was 1.7 times higher among children from low income households (21.9%) than those from high income households (12.9%). The differences between these two subgroups were also statistically significant in the children aged 5–6 years and 7–8 years. Non-cavitated lesions were about 1.6 times more prevalent among children whose parents had only school-level education (23.1%) than those whose parents had a tertiary education. The differences between these two subgroups were significant in the two younger age groups.

At the age of 12–14 years, boys (33.7%) were significantly more likely to have non-cavitated lesions than girls (23.9%). Whereas the prevalence among Indigenous children was very high (42.1%), the difference between Indigenous and non-Indigenous groups was not statistically significant. Similarly, among children aged 12–14 years the prevalence of non-cavitated lesions was 1.5 times higher for children whose last dental visit was for a problem (39.8%) than those who last visited for a check-up (26.1%).

In summary, more children from disadvantaged backgrounds including Indigenous identity, whose parents had less education or who were from low income households had non-cavitated lesions in their permanent teeth, as did the children whose last dental visit was for a problem. The prevalence was higher among older aged children.

Table 4.23: Percentage of children with non-cavitated carious lesions in the permanent dentition in the Queensland child population

	Population: children aged 6–14 years			
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**18.1**	**7.1**	**18.9**	**28.7**
	16.2–20.1	*5.4–9.1*	*16.4–21.6*	*25.4–32.3*
Sex				
Male	18.9	6.0	18.5	33.7
	16.6–21.4	*4.3–8.4*	*15.7–21.7*	*29.1–38.6*
Female	17.2	8.3	19.4	23.9
	14.9–19.7	*6.1–11.1*	*15.9–23.4*	*19.8–28.4*
Indigenous identity				
Non-Indigenous	17.3	6.3	18.3	27.7
	15.5–19.2	*4.7–8.3*	*15.9–21.0*	*24.4–31.2*
Indigenous	26.7	15.8	25.0	42.1
	19.4–35.5	*9.6–24.7*	*15.5–37.7*	*29.8–55.4*
Parent country of birth				
Australian born	19.0	7.4	19.5	30.7
	16.7–21.5	*5.6–9.8*	*16.4–22.9*	*26.5–35.2*
Overseas born	16.8	6.6	18.2	25.9
	14.5–19.4	*4.4–9.6*	*14.6–22.3*	*21.4–31.0*
Parental education				
School	23.1	10.3	25.0	33.3
	19.7–27.0	*7.2–14.5*	*19.8–31.0*	*27.5–39.6*
Vocational training	18.0	8.3	17.0	30.6
	14.9–21.7	*4.5–14.8*	*12.7–22.3*	*23.7–38.5*
Tertiary education	14.8	4.6	16.0	24.5
	12.8–17.0	*3.2–6.5*	*13.2–19.4*	*20.4–29.1*
Household income				
Low	21.9	9.2	24.5	31.3
	18.9–25.2	*6.5–12.7*	*20.2–29.3*	*25.4–37.9*
Medium	16.4	5.7	15.6	28.7
	14.0–19.0	*3.8–8.6*	*12.7–19.1*	*23.9–34.0*
High	12.9	5.5	13.6	20.3
	10.4–15.9	*3.2–9.2*	*10.1–18.0*	*14.8–27.2*
Residential location				
Major city	14.8	4.0	14.3	27.0
	12.6–17.2	*2.6–6.0*	*11.6–17.6*	*22.5–32.0*
Inner regional	18.0	5.3	18.3	29.5
	14.3–22.4	*2.4–11.5*	*13.4–24.5*	*22.2–37.9*
Outer regional	24.1	12.9	25.9	32.7
	20.0–28.7	*8.5–19.1*	*19.8–33.2*	*26.2–39.8*
Remote/Very remote	22.4	15.0	27.4	26.5
	13.8–34.2	*8.0–26.4*	*17.5–40.1*	*13.2–45.9*
Reason for last dental visit				
Check-up	17.1	6.6	17.2	26.1
	15.1–19.2	*4.8–8.9*	*14.6–20.1*	*22.4–30.0*
Dental problem	23.3	8.3	23.9	39.8
	19.9–27.0	*5.5–12.1*	*19.3–29.1*	*32.2–47.8*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Prevalence of children with severe caries experience in the permanent dentition

Most children with caries experience often have one or two permanent teeth affected. However, a small group of children have a higher number of teeth affected. This may be an indication of significant risk factors present in those children. Severe caries experience is strongly age-related. This Survey defined severe caries experience in the permanent dentition as having three or more permanent teeth with caries experience among children aged 12–14 years, two or more permanent teeth with caries experience among children aged 9–11 years and one or more permanent teeth with caries experience among children aged 6–8 years.

Some 16.1% of Queensland children had severe caries experience in the permanent dentition (Table 4.24). The lowest prevalence was observed among the youngest age group (11.2%) while the 12–14 years age group had the highest prevalence of 20.2%.

For all ages combined, the prevalence of severe caries experience in the permanent dentition was highest among children whose last visit was for a dental problem (26.5%) and lowest among those from high income households (11.1%). The prevalence of severe caries experience in the permanent dentition was significantly associated with parental education, household income and reason for last dental visit. Children whose parents had only school-level education were nearly two times more likely to have severe caries experience than children whose parents had some tertiary education. A similar relative difference was observed between children from low income households and children from high income households. Indigenous children were more likely to be in the severe caries experience group than non-Indigenous children. However, this difference was not statistically significant.

The difference between subgroups remained across age groups. The difference reached a statistically significant level between children whose parents had only school-level education and children whose parents had some tertiary education for the two older age groups. It was also significant between children aged 12–14 years whose last visit was for a dental problem and those who visited for a check-up.

In summary, certain groups of children had a more severe experience of dental caries in this population. Such groups were children from a lower socioeconomic background or those whose last visit was for a dental problem.

Table 4.24: Percentage of children with 'severe' permanent caries experience in the Queensland child population

	Population: children aged 6–14 years			
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**16.1**	**11.2**	**17.1**	**20.2**
	14.4–18.0	*9.3–13.5*	*14.7–19.8*	*17.4–23.3*
Sex				
Male	15.1	10.4	15.1	20.3
	13.1–17.3	*8.1–13.3*	*12.2–18.6*	*16.4–24.8*
Female	17.2	12.1	19.5	20.1
	14.8–19.9	*9.4–15.5*	*16.0–23.4*	*15.7–25.2*
Indigenous identity				
Non-Indigenous	15.6	11.1	16.1	19.8
	14.0–17.3	*9.1–13.4*	*13.8–18.6*	*17.0–22.9*
Indigenous	22.1	12.7	27.7	25.9
	15.5–30.4	*7.1–21.8*	*17.8–40.3*	*15.9–39.2*
Parent country of birth				
Australian born	15.1	10.8	15.0	20.0
	13.2–17.2	*8.4–13.6*	*12.6–17.7*	*16.4–24.1*
Overseas born	17.5	11.9	20.1	20.5
	14.9–20.5	*8.6–16.1*	*16.5–24.2*	*16.5–25.2*
Parental education				
School	21.7	13.3	24.7	26.9
	18.4–25.4	*9.7–17.9*	*19.8–30.4*	*21.2–33.5*
Vocational training	15.7	10.9	16.7	20.2
	13.0–18.8	*7.3–15.9*	*13.2–20.9*	*14.4–27.5*
Tertiary education	12.8	10.3	13.3	14.8
	10.9–14.8	*7.7–13.8*	*10.7–16.3*	*11.7–18.5*
Household income				
Low	20.9	12.9	22.2	27.2
	17.9–24.2	*9.7–16.9*	*18.4–26.5*	*21.5–33.6*
Medium	14.0	9.6	15.8	16.8
	12.0–16.2	*7.2–12.7*	*12.6–19.5*	*13.2–21.2*
High	11.1	9.9	9.5	14.0
	8.6–14.1	*6.2–15.4*	*6.3–14.0*	*9.2–20.7*
Residential location				
Major city	15.9	11.9	15.8	20.3
	13.3–18.8	*9.2–15.3*	*12.5–19.7*	*15.7–25.8*
Inner regional	17.1	8.6	20.5	22.1
	13.9–20.9	*5.5–13.2*	*15.3–26.8*	*16.4–29.1*
Outer regional	14.2	9.5	14.8	17.8
	11.9–16.8	*7.4–12.2*	*11.0–19.6*	*13.1–23.8*
Remote/Very remote	20.7	17.6	23.0	22.1
	14.0–29.5	*9.3–30.9*	*14.1–35.1*	*12.7–35.7*
Reason for last dental visit				
Check-up	13.4	8.5	14.0	17.1
	11.7–15.3	*6.8–10.7*	*11.5–16.9*	*14.1–20.6*
Dental problem	26.5	20.5	26.7	33.1
	22.8–30.6	*15.4–26.9*	*21.9–32.2*	*26.2–40.8*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Prevalence and experience of dental caries in the permanent dentition by regions

The prevalence and the severity of dental caries in the permanent dentition of children aged 6–14 years in Queensland varied between the four major regions (Table 4.25). Prevalence and experience of dental caries are presented for all ages combined and for each of the three age groups.

The prevalence of dental caries in the permanent dentition, i.e. the proportion of children with a DMFT score greater than 0, varied between the regions. For all ages combined, Townsville had a significantly lower prevalence of dental caries than that of Brisbane and the South-East regions. For all age group comparisons, the prevalence of dental caries was always lowest in Townsville while the other three regions were similar.

The prevalence of severe caries experience in the permanent dentition, as defined separately for each of the three age groups, varied between regions. For all ages combined, Townsville had a significantly lower prevalence of severe caries experience than that of all other regions. The prevalence of severe caries experience among children aged 12–14 years in the South-East region was 2.4-fold that of Townsville children of the same age.

The mean DMFT scores, i.e. average number of untreated decayed, missing or filled permanent teeth per child, varied between the four geographical regions. For all ages combined, Townsville children had a significantly lower mean DMFT score than that in the Brisbane and South-East regions. On average, children in Townsville had about 38% fewer teeth affected by dental caries than children in the two southern regions. Townsville children also had a lower DMFT score than children in the Northern region, but it was not statistically significant. Children in the South-East region had the highest score while children in Townsville had the lowest mean DMFT score among children aged 9-11-years and 12–14 years. The biggest relative difference was shown between the South-East region and Townsville where DMFT among children in the South-East was 1.8 times higher than that among Townsville's children. There were no differences in the DMFT score in the four regions among children aged 6–8 years.

The mean DMFS score, i.e. average number of untreated decayed, missing or filled permanent tooth surfaces per person, varied between the four regions of Queensland. For all ages combined, children in Townsville had a lower DMFS score compared with children in each of the other three regions. Statistically significant differences were seen between the Townsville, Brisbane and South-East regions. The absolute difference between the Northern and Townsville region was largest. However, it was not statistically significant as the confidence intervals of the estimate for the Northern region were wide because of low number of children in that region. There was no difference in DMFS score across the four regions among children aged 6–8 years. There were statistically significant differences between children aged 12–14 years in Townsville and children of the same age group in Brisbane and South-East areas.

In summary, the prevalence and severity of dental caries in the permanent dentition of children in Queensland significantly varied between geographical regions. The differences were recorded between the Townsville, Brisbane, and South-East regions.

Table 4.25: Prevalence and experience of dental caries in the permanent dentition by four regions of Queensland

		Population: children aged 6–14 years			
Major region		**Brisbane**	**South-East**	**Northern**	**Townsville**
Prevalence of decay experience					
All ages	per cent	30.4	29.4	30.3	22.3
	95%CI	*26.1–35.1*	*26.2–32.8*	*24.8–36.4*	*20.0–24.8*
6–8 years	per cent	13.0	10.3	11.5	7.9
	95%CI	*9.3–17.7*	*7.4–14.0*	*8.3–15.7*	*6.0–10.1*
9–11 years	per cent	30.7	31.7	35.0	23.7
	95%CI	*25.7–36.2*	*27.7–35.9*	*27.9–42.8*	*20.4–27.3*
12–14 years	per cent	48.0	46.7	46.7	34.7
	95%CI	*41.1–55.0*	*41.6–51.8*	*37.2–56.4*	*29.3–40.4*
Prevalence of severe caries experience					
All ages	per cent	16.4	16.4	17.2	9.3
	95%CI	*13.1–20.1*	*13.9–19.1*	*13.2–22.1*	*7.8–10.9*
6–8 years	per cent	13.0	10.3	11.5	7.9
	95%CI	*9.3–17.7*	*7.4–14.0*	*8.3–15.7*	*6.0–10.1*
9–11 years	per cent	17.4	15.8	22.2	10.5
	95%CI	*12.8–23.1*	*12.9–19.3*	*16.0–29.8*	*8.3–13.3*
12–14 years	per cent	18.8	23.1	18.0	9.4
	95%CI	*14.2–24.5*	*18.6–28.3*	*12.5–25.3*	*6.5–13.3*
Mean DMFT scores					
All ages	mean	0.7	0.7	0.8	0.4
	95%CI	*0.6–0.9*	*0.6–0.9*	*0.5–1.0*	*0.4–0.5*
6–8 years	mean	0.2	0.2	0.2	0.1
	95%CI	*0.1–0.2*	*0.1–0.3*	*0.1–0.3*	*0.1–0.2*
9–11 years	mean	0.7	0.6	0.9	0.4
	95%CI	*0.5–0.8*	*0.5–0.7*	*0.5–1.2*	*0.4–0.5*
12–14 years	mean	1.4	1.4	1.3	0.7
	95%CI	*1.1–1.6*	*1.2–1.7*	*0.9–1.8*	*0.6–0.9*
Mean DMFS scores					
All ages	mean	1.0	1.0	1.1	0.6
	95%CI	*0.9-1.1*	*0.9-1.2*	*0.6-1.5*	*0.5-0.7*
6–8 years	mean	0.2	0.3	0.3	0.3
	95%CI	*0.2-0.3*	*0.1-0.4*	*0.1-0.4*	*0.2-0.4*
9–11 years	mean	0.92	0.9	1.2	0.6
	95%CI	*0.7-1.2*	*0.7-1.1*	*0.6-1.7*	*0.5-0.7*
12–14 years	mean	1.9	2.0	1.9	1.0
	95%CI	*1.5-2.2*	*1.7-2.3*	*1.1-2.6*	*0.8-1.3*

Per cent: per cent of children.
Mean: average number per person.
95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Caries experience among children aged 12 years

The percentage of children with at least one untreated decayed, missing, filled permanent tooth and the number of untreated decayed, missing and filled permanent teeth among children aged 12 years in the Queensland child population are presented in Table 4.26. The average number of DMFT was 1.0, of which, 0.7 presented as filled teeth and 0.3 as untreated decayed teeth. Indigenous children, children from low income households, children whose parents had only a school-level education, or children whose last dental visit was for a dental problem had more untreated decayed teeth or more teeth with caries experience (DMFT) than their counterparts. However, no statistically significant differences in the mean number of decayed, missing or filled permanent teeth were found between subgroups.

More than one-third of the Queensland child population aged 12 years had experienced dental caries on their permanent dentition. Among different population groups of children aged 12 years, those whose last dental visit was for a dental problem had the highest prevalence of caries (48.5%) while the lowest prevalence of caries was found in children from high income households (35.1%). It was also found that caries experience was more prevalent in children from low income households, children of parents who had only school-level education, children whose last dental visit was for a dental problem, children who did not live in major cities, or Indigenous children. However, the differences were not statistically significant.

Table 4.26: Untreated decayed, missing, and filled teeth and percentage of Queensland children aged 12 years with DMFT>0

	Population: children aged 12 years			
	D	F	DMFT	% children with DMFT>0
All	**0.3**	**0.7**	**1.0**	**38.6**
	0.2–0.4	*0.6–0.9*	*0.8–1.2*	*33.8–43.7*
Sex				
Male	0.3	0.6	0.9	37.2
	0.2–0.4	*0.4–0.8*	*0.7–1.1*	*30.7–44.2*
Female	0.2	0.9	1.1	39.8
	0.1–0.4	*0.6–1.1*	*0.8–1.4*	*32.8–47.3*
Indigenous identity				
Non-Indigenous	0.2	0.7	1.0	38.3
	0.2–0.3	*0.5–0.9*	*0.8–1.1*	*33.1–43.7*
Indigenous	0.8	0.8	1.6	42.7
	0.1–1.6	*0.4–1.2*	*0.6–2.5*	*27.7–59.2*
Parental country of birth				
Australian born	0.3	0.8	1.1	40.7
	0.2–0.3	*0.6–1.0*	*0.8–1.3*	*34.3–47.4*
Overseas born	0.3	0.6	0.9	35.5
	0.1–0.5	*0.4–0.8*	*0.7–1.2*	*29.0–42.4*
Parental education				
School	0.5	0.9	1.4	43.9
	0.2–0.7	*0.6–1.2*	*1.0–1.7*	*34.8–53.4*
Vocational training	0.2	0.7	0.8	34.0
	0.0–0.3	*0.2–1.1*	*0.4–1.3*	*23.4–46.4*
Tertiary education	0.2	0.7	0.8	37.7
	0.1–0.3	*0.5–0.8*	*0.7–1.0*	*31.8–43.9*
Household income				
Low	0.4	0.8	1.2	41.5
	0.2–0.5	*0.5–1.0*	*0.9–1.4*	*33.3–50.2*
Medium	0.2	0.7	1.0	38.5
	0.1–0.3	*0.5–1.0*	*0.7–1.2*	*30.9–46.8*
High	0.1	0.7	0.8	35.1
	0.0–0.2	*0.4–1.0*	*0.5–1.1*	*25.4–46.0*
Residential location				
Major city	0.2	0.8	0.9	38.4
	0.1–0.3	*0.6–1.0*	*0.7–1.2*	*31.6–45.6*
Inner regional	0.2	0.6	0.7	32.5
	0.1–0.3	*0.3–0.8*	*0.4–1.0*	*23.1–43.6*
Outer regional	0.4	1.0	1.3	44.7
	0.1–0.6	*0.5–1.5*	*0.9–1.8*	*33.4–56.6*
Remote/Very remote	0.6	0.5	1.1	37.5
	0.2–1.5	*0.3–0.7*	*0.1–2.1*	*22.5–55.4*
Reason for last dental visit				
Check-up	0.3	0.7	0.9	37.1
	0.2–0.4	*0.5–0.9*	*0.7–1.2*	*31.6–43.0*
Dental problem	0.2	1.1	1.3	48.5
	0.1–0.4	*0.8–1.4*	*1.0–1.7*	*38.3–58.8*

Row 1: Mean scores and per cent.
Row 2: 95%CI: confidence interval for estimated mean or per cent.

Summary of findings regarding experience of dental decay in the permanent dentition

Over one-quarter (27.8%) of Queensland children aged 6–14 years had experienced dental caries in their permanent teeth. The average caries experience (DMFT score) was 0.6 teeth per child, of which, 0.2 teeth presented as untreated decay and 0.4 teeth as filled. As summarised in Table 4.27, all measures of caries including the prevalence and severity of untreated decayed or prevalence and severity of decayed, missing or filled teeth were strongly age-related. A markedly higher prevalence and severity of caries was observed for children who made their last dental visit for a problem compared to children who made their last dental visit for a check-up. Children from low income households experienced markedly more caries than those from medium and high income households. Differences were also found among parental education groups, but the magnitude of the difference was not as strong as between household income groups.

Table 4.27: Summary of decay experience in permanent teeth among children aged 6–14 years

	Population: children aged 6–14 years				
	Untreated decayed		Filled	DMFT	
	% people	Mean no. of teeth	Mean no. of teeth	% people	Mean no. of teeth
Age					
6–8 years	Ref	Ref	Ref	Ref	Ref
9–11 years	↑	↑	↑	↑↑	↑
12–14 years	↑↑	↑↑	↑↑	↑↑	↑↑
Sex					
Male	Ref	Ref	Ref	Ref	Ref
Female					
Indigenous identity					
Non-Indigenous	Ref	Ref	Ref	Ref	Ref
Indigenous					
Parent country of birth					
Australian born	Ref	Ref	Ref	Ref	Ref
Overseas born					
Parental education					
School	Ref	Ref	Ref	Ref	Ref
Vocational training	↓			↓	↓
Tertiary education	↓	↓	↓	↓	↓
Household income					
Low	Ref	Ref	Ref	Ref	Ref
Medium	↓			↓	↓
High	↓↓	↓	↓	↓	↓
Residential location					
Major city	Ref	Ref	Ref	Ref	Ref
Inner regional					
Outer regional					
Remote/Very remote					
Reason for last dental visit					
Check-up	Ref	Ref	Ref	Ref	Ref
Dental problem	↑	↑	↑	↑↑	↑

Ref=Reference group.
Symbols: ↓↓ Markedly lower; ↓ Lower; Not sig. different; ↑ Higher; ↑↑ Markedly higher.

4.2 Fissure sealant use

The back (molar) teeth account for most of the caries experience in the permanent teeth of children and adolescents. The molar teeth have many grooves (fissures) and pits on the chewing (occlusal) surface and on the buccal and palatal surfaces, which can be very difficult to keep clean. These are the sites most susceptible for developing caries.

Fissure sealants are materials that are applied to the pits and fissure surfaces of teeth to create a thin barrier which protects the sealed surfaces from caries. Fissure sealant materials fall into two categories: resin-based sealants or glass-ionomer (cement) sealants. Fissure sealants are applied to the pit and fissure surfaces of the teeth by dental professionals. This report describes the proportion of children who had at least one tooth with a fissure sealant and the number of fissure sealants per person in the Queensland child population.

Proportion of children with a fissure sealant

The proportion of children with at least one tooth with a fissure sealant is reported in Table 4.28. Fissure sealant use may reflect the access to dental care for prevention or level of perceived risk of having future dental caries.

Some 22% of Queensland children aged 6–14 years had at least one tooth with a fissure sealant, i.e. nearly one in every four children aged 6–14 years had at least one tooth fissure sealed. As expected, this proportion increased across older age groups. Some 32.4% of children aged 12–14 years had at least one fissure sealed tooth, which was 3-fold higher than that of the youngest age group (10.7%).

Across all ages combined, there was little variation between population subgroups. The proportion with a fissure sealant was highest among children living in remote/very remote areas and lowest among males. Indigenous children, children from high income households or children from remote/very remote areas were more likely to have a higher prevalence of fissure sealants than non-Indigenous children, children from low income households or children from major cities, inner regional and outer regional areas. However, the differences were not statistically significant. There were no differences among groups by sex, parental country of birth, parental education or reason for the last dental visit. Across age groups, there was some variation between subgroups. However, no statistically significant differences were observed.

In summary, the use of fissure sealants was mostly uniform between subgroups of the Queensland child population.

Table 4.28: Percentage of children with at least one permanent fissure sealant among the Queensland child population

		Population: children aged 6–14 years		
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**22.0**	**10.7**	**23.2**	**32.4**
	20.1–24.0	*9.1–12.6*	*20.3–26.2*	*28.9–36.1*
Sex				
Male	20.7	11.0	23.1	28.9
	18.5–23.2	*8.9–13.4*	*19.7–26.8*	*24.0–34.3*
Female	23.3	10.5	23.2	35.9
	20.8–25.9	*8.2–13.2*	*19.5–27.3*	*31.4–40.6*
Indigenous identity				
Non-Indigenous	21.5	10.7	22.3	31.7
	19.5–23.5	*8.9–12.7*	*19.5–25.4*	*28.1–35.6*
Indigenous	27.9	11.5	32.2	41.8
	23.0–33.2	*5.9–21.3*	*24.0–41.6*	*32.3–51.8*
Parent country of birth				
Australian born	22.1	11.9	23.5	31.6
	19.8–24.6	*9.7–14.5*	*19.9–27.5*	*27.2–36.2*
Overseas born	21.7	9.0	22.7	33.7
	19.2–24.4	*6.7–12.0*	*18.9–27.0*	*28.6–39.2*
Parental education				
School	20.9	9.4	23.0	29.6
	17.9–24.2	*6.8–12.8*	*17.9–29.0*	*24.2–35.6*
Vocational training	21.5	6.0	23.1	37.6
	18.0–25.4	*3.6–9.7*	*17.8–29.4*	*30.6–45.0*
Tertiary education	22.8	13.4	23.9	31.9
	20.5–25.3	*10.9–16.4*	*20.3–27.9*	*26.8–37.4*
Household income				
Low	21.0	8.9	22.6	30.6
	18.2–24.0	*6.4–12.3*	*18.6–27.3*	*25.7–36.0*
Medium	21.1	10.4	21.1	32.6
	18.7–23.6	*7.9–13.6*	*17.7–24.8*	*28.0–37.6*
High	24.9	15.9	26.0	33.7
	21.5–28.6	*12.0–20.6*	*20.2–32.7*	*26.3–41.9*
Residential location				
Major city	21.8	10.0	23.3	33.1
	19.1–24.7	*7.8–12.5*	*19.3–27.7*	*27.8–38.7*
Inner regional	17.5	9.9	17.5	24.6
	13.5–22.3	*6.1–15.6*	*12.5–24.0*	*17.3–33.7*
Outer regional	24.2	9.9	25.8	36.1
	20.9–27.9	*7.4–13.1*	*20.5–32.0*	*30.1–42.5*
Remote/Very remote	28.0	19.1	26.3	42.9
	21.9–34.9	*13.0–27.1*	*18.8–35.3*	*31.8–54.7*
Reason for last dental visit				
Check-up	22.9	11.7	23.2	32.5
	20.8–25.1	*9.6–14.2*	*20.4–26.3*	*28.6–36.7*
Dental problem	23.1	13.6	23.7	33.2
	19.8–26.6	*10.1–18.0*	*18.2–30.1*	*26.8–40.1*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

4.3 Oral hygiene status

Dental plaque is an associated factor for caries and it has been demonstrated that poor oral hygiene contributes to an increased risk of caries. There is a high correlation between poor oral hygiene and the development of gingival inflammation, gingivitis, an early reversible form of periodontal disease. The oral hygiene status of Queensland children was determined using the plaque/debris index and gingival index by Loe and Sillness (Loe 1967).

Prevalence of dental plaque

The prevalence of moderate or severe accumulation of dental plaque (which can be seen by the naked eye) in the Queensland child population was 47.1% (Table 4.29). Plaque accumulation was strongly related to age, sex, Indigenous identity, household income and residential location.

Among different population groups of children of all ages, children living in outer regional areas had the highest percentage of plaque accumulation (63.4%) followed by Indigenous children (61.2%). Plaque accumulation was 1.3 times more prevalent among boys (52.5%) and Indigenous children (61.2%) than girls (41.4%) and non-Indigenous children (45.9%). Children of higher income households had a lower percentage of plaque accumulation. However, statistically significant differences were only shown among children from the highest (39.5%) and lowest (51.9%) household income groups. Children from major cities had a lower prevalence than children from other regions. There were no significant differences among groups by parental country of birth, parental education, or reason for the last dental visit.

The prevalence of plaque accumulation increased from 36.2% in children aged 5–6 years to 55.4% in ages 9–10 years and then decreased for children aged 13–14 years (39.8%). This reduction in the oldest age group was likely due to the increased independence of children as they get older, and also as they become more conscious about their sensory and social acceptability including appearance of teeth. The difference by sex was not statistically significant at a younger age but reached statistical significance from ages 9–10 years and for older age groups. The difference in the prevalence of dental plaque was 1.5-fold between boys and girls aged 13–14 years.

In summary, the prevalence of visible plaque accumulation was strongly related to age and sex. It was also associated with socioeconomic factors such as household income, residential location and Indigenous identity.

Table 4.29: Percentage of children with a plaque index score of 2+ (visible plaque accumulation) in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**47.1**	**36.2**	**53.7**	**55.4**	**50.8**	**39.8**
	43.6–50.7	*31.1–41.7*	*47.6–59.8*	*50.6–60.1*	*46.2–55.3*	*34.0–45.9*
Sex						
Male	52.5	36.6	57.8	62.2	58.4	47.2
	48.5–56.6	*31.1–42.5*	*50.7–64.7*	*56.2–67.8*	*52.5–64.0*	*39.7–54.9*
Female	41.4	35.9	49.1	47.2	43.8	31.9
	37.6–45.2	*29.6–42.8*	*42.2–56.1*	*41.8–52.7*	*38.3–49.4*	*25.3–39.3*
Indigenous identity						
Non-Indigenous	45.9	34.5	52.4	54.5	49.7	39.3
	42.4–49.4	*29.3–40.1*	*46.5–58.2*	*49.6–59.4*	*45.0–54.3*	*33.5–45.4*
Indigenous	61.2	60.0	67.4	64.6	63.5	46.9
	50.7–70.7	*45.2–73.2*	*50.4–80.9*	*53.2–74.6*	*46.4–77.8*	*29.8–64.7*
Parent country of birth						
Australian born	49.0	37.1	53.5	57.6	53.1	44.1
	45.1–52.8	*31.0–43.6*	*45.6–61.2*	*52.3–62.8*	*47.9–58.4*	*37.0–51.4*
Overseas born	44.5	35.0	54.1	52.5	47.3	34.0
	40.3–48.7	*28.6–42.0*	*47.4–60.7*	*45.8–59.0*	*41.7–53.0*	*27.0–41.9*
Parental education						
School	52.3	43.9	54.3	60.4	56.7	47.3
	47.4–57.1	*36.2–51.8*	*44.2–64.0*	*52.8–67.5*	*49.6–63.4*	*37.4–57.3*
Vocational training	47.6	35.1	53.5	58.6	47.3	43.8
	42.5–52.7	*26.6–44.6*	*43.3–63.3*	*50.0–66.8*	*39.1–55.6*	*33.2–55.0*
Tertiary education	44.0	32.3	53.5	52.9	48.2	32.8
	40.0–48.1	*27.1–38.0*	*46.6–60.3*	*46.8–58.9*	*42.9–53.6*	*26.4–40.1*
Household income						
Low	51.9	41.2	52.6	61.5	55.7	47.9
	47.3–56.5	*33.9–48.9*	*43.4–61.6*	*54.4–68.1*	*48.7–62.5*	*39.1–56.7*
Medium	46.0	34.0	53.8	53.5	51.0	39.2
	42.0–50.0	*27.1–41.6*	*46.6–60.9*	*46.8–60.1*	*44.2–57.8*	*32.6–46.3*
High	39.5	27.8	51.7	48.6	41.4	27.8
	34.4–44.9	*21.0–35.8*	*42.5–60.8*	*40.7–56.6*	*34.3–48.9*	*19.1–38.6*
Residential location						
Major city	37.9	28.5	46.9	46.6	41.9	26.2
	33.3–42.8	*21.8–36.2*	*39.7–54.4*	*40.4–52.9*	*35.6–48.5*	*19.8–33.8*
Inner regional	47.9	33.1	50.2	53.5	52.6	50.9
	40.0–55.9	*22.7–45.4*	*35.4–65.0*	*40.1–66.5*	*43.5–61.6*	*41.8–59.9*
Outer regional	63.4	58.7	63.4	74.1	66.9	53.9
	57.1–69.3	*49.2–67.7*	*47.6–76.8*	*67.1–80.0*	*59.1–73.9*	*42.7–64.7*
Remote/Very remote	58.2	40.3	76.4	62.7	58.2	53.4
	46.1–69.4	*25.6–57.0*	*62.2–86.4*	*49.3–74.3*	*36.6–77.0*	*27.8–77.4*
Reason for last dental visit						
Check-up	46.0	35.2	51.7	53.0	50.2	38.4
	42.5–49.5	*29.5–41.4*	*45.6–57.9*	*47.7–58.3*	*45.5–54.9*	*32.4–44.7*
Dental problem	54.0	46.3	58.0	61.6	52.3	46.8
	48.9–59.0	*36.0–57.0*	*49.0–66.5*	*54.1–68.6*	*44.5–60.0*	*35.6–58.3*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Prevalence of gingival inflammation

Gingivitis (or gum disease) in children is mostly caused by dental plaque. The percentage of children with gingival bleeding on probing is presented in Table 4.30.

Nearly 20% of all children aged 5–14 years had gingivitis. This percentage increased across age groups with the lowest percentage of gingivitis among children aged 5–6 years (11%), the highest percentage of gingivitis among those aged 9–10 years (22.1%) and lower again among those aged 13–14 years (19.5%).

Among different population groups of children of all ages, children who lived in a major city had the lowest prevalence of gingivitis (12.7%), whereas Indigenous children had the highest percentage with gingivitis (33.9%).

Among children of all ages, gingivitis was almost 2.0 times more prevalent among Indigenous children (33.9%) than non-Indigenous children (17.5%) and about 2.2 times more prevalent among children living in outer regional (27.6%) or remote/very remote areas (27.6%) than among children living in major cities (12.7%).

Boys, children whose parents had only school-level education, children from low income households, children who last made a dental visit for a problem, and children with Australian born parents were more likely to have gingivitis than their counterparts. However, the differences were not statistically significant.

The largest differences were apparent among children aged 5–6 years with a 3.6-fold difference in gingivitis between children from low income households (15.3%) and children from high income households (4.3%). Similarly in children aged 11–12 years the prevalence of gingivitis was 2.5 times higher for Indigenous children (46.5%) relative to non-Indigenous children (19.0%). About 1.9 times more children aged 11–12 years of parents who had only school-level education had gingivitis than those who had tertiary educated parents.

In summary, more children from disadvantaged backgrounds including children of Indigenous identity, children whose parents had less education, children living in rural areas and those aged 9–12 years had a higher prevalence of gingivitis than their respective counterparts.

Table 4.30: Percentage of children with gingivitis (gingival index score of 2+) in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**18.8**	**11.0**	**20.3**	**22.1**	**21.1**	**19.5**
	16.3–21.5	*8.3–14.4*	*15.8–25.6*	*18.6–26.1*	*17.8–24.9*	*15.0–24.9*
Sex						
Male	21.4	10.8	23.4	25.7	23.7	23.0
	18.5–24.6	*7.5–15.3*	*17.7–30.2*	*20.9–31.2*	*19.3–28.7*	*16.6–30.9*
Female	16.0	11.1	16.8	17.7	18.8	15.8
	13.5–18.8	*7.8–15.6*	*12.6–22.1*	*13.9–22.2*	*15.1–23.1*	*11.3–21.6*
Indigenous identity						
Non-Indigenous	17.5	10.1	18.3	21.3	19.0	19.0
	15.3–19.9	*7.3–13.7*	*14.3–23.1*	*17.7–25.3*	*15.9–22.4*	*14.6–24.3*
Indigenous	33.9	22.7	40.7	30.5	46.5	26.4
	22.8–47.0	*14.0–34.7*	*23.6–60.4*	*18.5–46.0*	*28.1–65.8*	*13.9–44.4*
Parent country of birth						
Australian born	20.5	10.9	20.8	25.0	22.7	23.5
	17.5–23.9	*7.2–16.2*	*15.9–26.8*	*21.0–29.4*	*18.6–27.3*	*17.1–31.4*
Overseas born	16.3	11.0	19.4	18.1	18.9	14.1
	13.7–19.3	*7.6–15.7*	*13.9–26.5*	*13.9–23.3*	*14.7–24.0*	*10.1–19.2*
Parental education						
School	22.2	16.7	22.0	21.7	30.5	20.2
	18.5–26.4	*12.1–22.7*	*15.7–30.0*	*16.3–28.2*	*23.7–38.2*	*13.1–29.8*
Vocational training	19.0	7.7	21.4	22.6	20.0	24.2
	15.5–23.1	*4.3–13.4*	*14.0–31.3*	*15.8–31.3*	*14.2–27.4*	*15.5–35.8*
Tertiary education	16.6	9.3	18.5	22.3	16.3	17.0
	13.9–19.6	*6.4–13.2*	*13.3–25.1*	*17.9–27.4*	*13.1–20.2*	*12.4–22.9*
Household income						
Low	21.0	15.3	20.8	23.8	23.1	21.4
	17.5–24.9	*10.8–21.4*	*13.6–30.3*	*18.2–30.4*	*17.2–30.3*	*15.4–29.0*
Medium	17.8	10.3	20.0	21.6	19.4	18.6
	15.0–21.0	*7.5–14.0*	*14.8–26.5*	*16.2–28.2*	*15.1–24.7*	*13.3–25.5*
High	15.1	4.3	18.4	18.7	16.8	16.9
	12.1–18.7	*2.1–8.7*	*11.8–27.5*	*13.8–24.8*	*11.4–24.2*	*10.8–25.5*
Residential location						
Major city	12.7	7.0	11.4	16.1	16.5	12.8
	10.2–15.6	*4.3–10.9*	*6.8–18.6*	*12.4–20.7*	*12.7–21.3*	*9.1–17.5*
Inner regional	20.7	12.1	23.6	23.6	18.9	25.4
	15.2–27.5	*6.7–20.7*	*15.0–35.0*	*15.6–34.0*	*13.2–26.3*	*14.2–41.2*
Outer regional	27.6	19.4	31.0	29.7	29.1	28.0
	22.6–33.3	*11.9–30.1*	*21.1–43.1*	*22.6–37.9*	*22.4–36.9*	*18.4–40.2*
Remote/Very remote	27.6	12.9	36.3	35.1	33.2	20.3
	16.0–43.3	*6.5–23.8*	*20.5–55.6*	*21.0–52.5*	*15.6–57.2*	*8.5–40.9*
Reason for last dental visit						
Check-up	18.4	9.0	18.8	20.7	21.5	19.4
	15.8–21.2	*6.4–12.4*	*13.9–24.8*	*17.1–24.8*	*17.7–25.8*	*14.7–25.3*
Dental problem	20.7	11.3	23.1	25.2	19.8	20.1
	17.2–24.7	*7.0–17.9*	*16.4–31.6*	*19.1–32.6*	*14.2–26.9*	*13.5–28.9*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Summary of oral hygiene status of the Queensland child population

Nearly half of Queensland children aged 5–14 years had moderate or severe accumulation of dental plaque, which can be seen by the naked eye, and one-fifth of Queensland children had gingivitis.

As summarised in Table 4.31, age was strongly related to accumulation of plaque and gingivitis, as presented in Tables 4.29 and 4.30. Compared with children aged 5–6 years, older age groups had a markedly higher percentage of children with plaque and gingivitis. A markedly higher percentage of plaque and gingivitis was observed for children who lived in outer regional and remote/very remote areas compared to major cities and inner regional areas. Plaque and gingivitis prevalence were consistently higher among Indigenous children than among their non-Indigenous counterparts. The prevalence of plaque was lower among girls or children from the high income households than among boys or children from lower income households groups.

Table 4.31: Summary of oral hygiene status

	Population aged 5–14 years	
	Plaque (score= 2+)	Gingivitis (score=2+)
	% children	% children
Age		
5–6 years	Ref	Ref
7–8 years	↑↑	↑
9–10 years	↑↑	↑↑
11–12 years	↑↑	↑↑
13–14 years		↑
Sex		
Male	Ref	Ref
Female	↓	
Indigenous identity		
Non-Indigenous	Ref	Ref
Indigenous	↑	↑↑
Parent country of birth		
Australian born	Ref	Ref
Overseas born		
Parental education		
School	Ref	Ref
Vocational training		
Tertiary education		
Household income		
Low	Ref	Ref
Medium		
High	↓↓	
Residential location		
Major city	Ref	Ref
Inner regional		
Outer regional	↑↑	↑↑
Remote/Very remote	↑↑	↑↑
Reason for last dental visit		
Check-up	Ref	Ref
Dental problem		

Ref=Reference group.
Symbols: ↓↓ Markedly lower; ↓ Lower; Not sig. different; ↑ Higher; ↑↑ Markedly higher.

4.4 Other conditions

Prevalence of dental trauma

Children whose Survey dental examination revealed the presence of any trauma in their permanent dentition were classified as having dental trauma. Trauma was examined based on worst condition observed among six anterior permanent teeth in the upper jaw. Visual assessment was confirmed by interview. This report describes the proportion of children who had any trauma on their upper anterior teeth.

Nearly 8% of children aged 5–14 years had experience of dental trauma (Table 4.32). This prevalence was higher among older age groups. The percentage of children with dental trauma was 4.3% at age 5–6 years and 12.7% in the oldest age group. The differences between children aged 5–6 years, 7–8 years, and the older age groups were statistically significant.

For all ages combined, the prevalence of any dental trauma was equally highest among Indigenous children and children whose last dental visit was for a problem, and lowest among females. The prevalence of trauma of all ages combined was significantly associated with sex and reason for the last dental visit. The association with Indigenous identity was of borderline significance.

Across age groups, males aged 11–12 years had a significantly higher prevalence of dental trauma than females of the same age. Children aged 11–12 years whose parents were Australian born also had a significantly higher prevalence of trauma than children whose parents were born overseas. Other socioeconomic factors were not significantly associated with the prevalence of dental trauma.

In summary, the prevalence of dental trauma was significantly associated with age. It was also significantly higher among males and among children whose last dental visit was for a dental problem.

Table 4.32: Percentage of children with any dental trauma in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**7.9**	**4.3**	**3.6**	**8.8**	**10.8**	**12.7**
	7.0-9.1	*2.7-6.7*	*2.4-5.2*	*6.8-11.3*	*8.9-13.0*	*10.1-15.8*
Sex						
Male	9.6	5.0	4.1	9.5	14.7	15.2
	8.1-11.2	*2.8-8.6*	*2.5-6.6*	*6.9-13.0*	*11.8-18.3*	*11.4-19.9*
Female	6.2	3.7	3.0	7.8	7.2	9.9
	5.2-7.5	*2.0-6.5*	*1.8-5.0*	*5.6-10.8*	*5.2-9.8*	*6.8-14.1*
Indigenous identity						
Non-Indigenous	7.6	4.3	3.3	8.1	10.1	12.8
	6.7-8.8	*2.7-6.9*	*2.2-4.9*	*6.4-10.1*	*8.2-12.3*	*10.2-16.1*
Indigenous	11.4	4.5	6.7	15.5	19.0	10.0
	8.2-15.6	*0.9-20.4*	*2.4-17.6*	*7.1-30.6*	*11.3-30.2*	*4.5-20.7*
Parent country of birth						
Australian born	8.9	4.1	3.7	9.9	13.2	14.3
	7.6–10.4	*2.4–6.8*	*2.4–5.8*	*7.1–13.6*	*10.6–16.4*	*10.7–19.0*
Overseas born	6.5	4.7	3.3	7.1	7.3	10.3
	5.4–7.9	*2.4–9.0*	*1.9–5.7*	*4.7–10.8*	*5.1–10.2*	*7.2–14.6*
Parental education						
School	8.1	3.1	3.7	10.3	10.2	12.6
	6.4–10.3	*1.0–9.7*	*2.0–6.8*	*7.0–15.0*	*7.0–14.6*	*8.3–18.8*
Vocational training	9.1	3.0	5.4	12.3	10.6	15.5
	7.3–11.3	*1.4–6.6*	*2.7–10.5*	*8.1–18.4*	*6.5–16.7*	*10.7–22.0*
Tertiary education	7.5	5.0	2.9	6.7	11.3	12.0
	6.3–8.8	*3.0–8.3*	*1.5–5.4*	*4.5–9.8*	*8.6–14.9*	*8.3–16.9*
Household income						
Low	7.6	2.6	5.6	10.6	9.8	8.7
	5.9–9.6	*0.8–7.6*	*3.2–9.4*	*7.1–15.5*	*6.9–13.6*	*5.7–13.1*
Medium	8.2	5.1	1.8	8.9	12.7	13.3
	6.8–9.8	*2.9–8.6*	*0.8–3.9*	*6.3–12.3*	*9.8–16.4*	*9.6–18.2*
High	8.9	4.8	4.1	6.1	9.8	20.8
	7.1–11.1	*2.1–10.4*	*1.9–8.8*	*3.6–10.3*	*6.5–14.3*	*13.9–30.0*
Residential location						
Major city	7.0	2.4	4.2	7.3	11.2	10.8
	5.6–8.8	*1.1–5.0*	*2.6–6.8*	*5.3–9.9*	*8.4–14.9*	*7.2–15.9*
Inner regional	8.7	9.5	2.2	12.2	8.0	11.1
	6.5–11.5	*5.1–16.9*	*0.7–6.7*	*5.9–23.7*	*4.8–13.2*	*6.3–19.0*
Outer regional	9.8	4.4	3.6	10.0	13.7	16.5
	8.1–11.8	*2.2–8.3*	*1.7–7.4*	*6.8–14.5*	*10.7–17.4*	*11.4–23.3*
Remote/Very remote	7.3	4.4	3.1	6.1	8.3	18.5
	4.9–10.5	*1.3–13.8*	*0.9–9.7*	*2.7–13.3*	*4.2–15.8*	*13.2–25.4*
Reason for last dental visit						
Check-up	7.4	3.8	3.7	7.9	9.3	11.2
	6.4–8.7	*2.2–6.3*	*2.3–5.7*	*5.5–11.1*	*7.4–11.7*	*8.5–14.5*
Dental problem	11.4	7.1	3.2	12.0	16.1	19.0
	9.3–13.9	*2.7–17.5*	*1.5–6.5*	*8.3–17.0*	*11.6–21.9*	*13.3–26.5*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Prevalence of oral mucosal conditions

Children whose Survey examination revealed ulcers or other non-ulcerated mucosal conditions were classified as having mucosal lesions. Odontogenic abscesses were not included in this classification. Table 4.33 describes the proportion of children who had any of those conditions observed at the time of examination.

Nearly 8% of all children aged 5–14 years had mucosal conditions at the time of examination. The prevalence of these conditions was lowest at ages 5–6 years (5.1%) and increased across the age groups with a highest percentage among ages 11–12 years (9.5%). The prevalence was lower again at ages 13–14 years (8.0%).

Across all ages combined, there were no significant variations. The highest prevalence of any mucosal lesion was observed among children living in the outer regional areas and was lowest among children living in a major city. None of the observed variations between subgroups were statistically significant.

Across age groups, there were also non-significant variations. The observed prevalence had a wide corresponding 95%CI range due to the low number of children observed with the condition.

In summary, just less than one in ten Queensland children was observed with a mucosal ulcerated or non-ulcerated lesion. The prevalence was not significantly associated with any socioeconomic factor.

Table 4.33: Percentage of children with oral mucosal lesions in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**7.8**	**5.1**	**7.9**	**8.8**	**9.5**	**8.0**
	6.9–8.9	*3.7–6.8*	*6.0–10.4*	*6.9–11.1*	*7.7–11.7*	*6.1–10.4*
Sex						
Male	7.7	4.0	9.3	8.1	9.5	7.7
	6.5–9.1	*2.5–6.4*	*6.4–13.4*	*5.9–11.1*	*7.0–12.8*	*5.1–11.4*
Female	8.0	6.1	6.3	9.7	9.5	8.3
	6.7–9.5	*4.0–9.3*	*4.4–9.1*	*7.1–13.1*	*7.0–12.9*	*5.5–12.2*
Indigenous identity						
Non-Indigenous	8.0	5.3	8.2	9.1	9.8	7.6
	7.0–9.1	*3.9–7.2*	*6.1–11.0*	*7.1–11.5*	*7.9–12.1*	*5.6–10.1*
Indigenous	6.3	1.6	4.7	6.2	6.3	13.7
	4.0–9.9	*0.5–5.5*	*1.7–12.6*	*2.4–14.9*	*2.5–14.8*	*6.1–28.1*
Parent country of birth						
Australian born	8.7	6.4	8.0	10.1	10.2	9.1
	7.5–10.1	*4.4–9.2*	*5.5–11.4*	*7.7–13.3*	*8.0–12.9*	*6.3–12.9*
Overseas born	6.6	3.2	7.9	7.0	8.6	6.5
	5.4–8.0	*1.8–5.5*	*5.1–11.9*	*4.9–9.9*	*6.0–12.2*	*4.2–9.8*
Parental education						
School	8.2	4.4	7.6	11.0	9.2	8.8
	6.7–10.1	*2.3–8.1*	*4.6–12.4*	*6.9–17.1*	*6.3–13.2*	*5.5–14.0*
Vocational training	7.8	5.1	9.0	9.0	8.3	7.8
	6.2–9.8	*2.7–9.6*	*4.9–16.0*	*5.5–14.2*	*4.9–13.8*	*4.3–13.6*
Tertiary education	7.8	5.4	8.1	7.5	10.2	7.7
	6.6–9.2	*3.6–8.1*	*5.5–11.8*	*5.5–10.2*	*7.6–13.6*	*5.4–10.9*
Household income						
Low	7.8	3.5	7.1	9.7	9.2	8.9
	6.3–9.6	*1.7–6.9*	*4.3–11.6*	*6.6–14.0*	*6.4–13.1*	*5.2–14.6*
Medium	7.5	6.1	7.7	6.5	9.8	7.6
	6.2–9.0	*4.1–9.0*	*4.9–11.8*	*4.5–9.3*	*7.1–13.3*	*5.0–11.4*
High	9.4	6.0	10.9	10.8	10.9	8.3
	7.3–12.0	*2.8–12.5*	*6.7–17.2*	*7.4–15.4*	*7.1–16.5*	*4.7–14.2*
Residential location						
Major city	6.9	3.6	7.3	8.3	7.8	7.6
	5.8–8.2	*2.3–5.7*	*4.9–10.8*	*5.9–11.6*	*5.4–11.2*	*4.9–11.6*
Inner regional	7.3	5.7	3.3	6.0	13.3	7.7
	5.3–10.0	*2.3–13.8*	*1.2–8.8*	*3.0–11.7*	*8.9–19.4*	*3.3–17.1*
Outer regional	10.4	8.6	11.2	12.2	11.9	8.2
	8.3–12.9	*5.3–13.5*	*6.9–17.8*	*7.8–18.4*	*8.1–17.2*	*5.5–12.0*
Remote/Very remote	7.9	4.8	11.4	8.7	3.8	11.9
	5.8–10.6	*2.2–10.4*	*5.9–21.0*	*4.3–16.7*	*1.3–10.6*	*5.1–25.3*
Reason for last dental visit						
Check-up	8.1	5.8	8.5	8.4	9.0	8.1
	7.0–9.3	*4.0–8.4*	*6.2–11.5*	*6.4–10.9*	*7.0–11.6*	*6.0–10.7*
Dental problem	8.1	3.8	6.3	10.2	10.7	7.6
	6.3–10.2	*1.6–8.8*	*3.5–11.2*	*6.5–15.7*	*7.2–15.7*	*4.2–13.4*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Prevalence of odontogenic abscesses

An odontogenic abscess is a localised infection around the tooth apex and submucosa due to gross caries or trauma. If an odontogenic abscess was observed, attempts were made to link the abscess with the tooth or teeth for its origin in that child. This report describes the proportion of children who were observed with an odontogenic abscess at the time of the examination.

Some 1.8% of all children in Queensland were found to have an odontogenic abscess. This proportion fluctuated with age, with the highest prevalence at ages 7–8 years corresponding with the highest level of caries experience in the primary dentition (Table 4.34).

For all ages combined, the prevalence of odontogenic abscesses was highest among children whose last visit was for a dental problem and lowest among children whose last visit was for a check-up. The prevalence of odontogenic abscesses was significantly associated with the reason for the last dental visit. There were some variations between other population subgroups. However, none of the variations were statistically significant.

Across age groups, those children whose last visit was for a dental problem also had a higher prevalence of odontogenic abscesses. Children aged 7–8 years from low income households had a significantly higher prevalence of odontogenic abscesses than children from high income households.

In summary, odontogenic abscesses were linked with dental caries in the primary dentition. The prevalence was low and varied between household income groups and by the reason for last dental visit.

Table 4.34: Percentage of children with odontogenic abscesses in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**1.8**	**3.6**	**3.0**	**2.2**	**0.2**	**0.0**
	1.3–2.5	*2.1–6.1*	*1.8–5.1*	*1.4–3.5*	*0.1–0.8*	—
Sex						
Male	1.5	2.2	3.3	1.8	0.0	0.0
	0.9–2.4	*1.0–4.8*	*1.5–6.8*	*0.9–3.5*	*0.0–0.2*	—
Female	2.2	5.0	2.8	2.7	0.4	0.0
	1.4–3.3	*2.6–9.1*	*1.3–5.8*	*1.4–5.4*	*0.1–1.5*	—
Indigenous identity						
Non-Indigenous	1.8	3.7	3.0	2.2	0.1	0.0
	1.3–2.6	*2.2–6.4*	*1.7–5.3*	*1.3–3.5*	*0.0–0.7*	—
Indigenous	2.0	1.8	3.4	2.9	1.2	0.0
	0.8–4.6	*0.4–8.2*	*0.5–18.6*	*0.8–9.2*	*0.2–8.3*	—
Parent country of birth						
Australian born	1.6	2.3	3.5	2.4	0.0	0.0
	1.1–2.4	*1.1–4.8*	*1.8–6.5*	*1.3–4.3*	—	—
Overseas born	2.1	5.6	2.4	2.0	0.5	0.0
	1.4–3.2	*3.1–9.6*	*1.0–5.9*	*1.0–4.2*	*0.1–1.9*	—
Parental education						
School	2.3	4.2	5.2	2.7	0.1	0.0
	1.3–4.1	*1.8–9.4*	*2.6–10.2*	*0.9–7.8*	*0.0–0.3*	—
Vocational training	2.1	3.7	2.9	3.2	0.0	0.0
	1.2–3.5	*1.4–9.2*	*0.9–8.7*	*1.4–7.0*	—	—
Tertiary education	1.5	3.4	2.1	1.5	0.2	0.0
	1.0–2.3	*1.8–6.5*	*1.1–4.2*	*0.7–3.0*	*0.0–1.3*	—
Household income						
Low	2.4	5.0	3.4	3.7	0.3	0.0
	1.6–3.7	*2.4–10.3*	*1.7–6.7*	*1.9–6.8*	*0.1–1.9*	—
Medium	1.3	1.8	3.2	1.5	0.0	0.0
	0.7–2.5	*0.7–4.4*	*1.2–8.2*	*0.7–3.4*	—	—
High	1.7	5.6	3.0	0.1	0.0	0.0
	0.9–3.1	*2.6–11.5*	*1.1–7.7*	*0.0–0.5*	—	—
Residential location						
Major city	2.1	4.9	2.5	2.4	0.2	0.0
	1.3–3.2	*2.5–9.5*	*1.2–4.9*	*1.3–4.3*	*0.0–1.4*	—
Inner regional	2.1	3.2	6.4	1.5	0.0	0.0
	1.0–4.4	*1.3–8.0*	*2.3–16.4*	*0.4–5.8*	—	—
Outer regional	1.2	1.0	2.2	2.6	0.5	0.0
	0.6–2.5	*0.4–2.4*	*0.9–5.4*	*0.9–7.1*	*0.1–2.8*	—
Remote/Very remote	1.0	2.7	0.0	1.8	0.0	0.0
	0.4–2.5	*0.7–9.7*	—	*0.5–6.6*	—	—
Reason for last dental visit						
Check-up	1.0	1.1	2.9	1.0	0.2	0.0
	0.6–1.5	*0.5–2.7*	*1.5–5.7*	*0.5–2.1*	*0.0–0.8*	—
Dental problem	4.0	11.0	4.5	5.3	0.5	0.0
	2.6–6.0	*5.8–20.1*	*2.1–9.4*	*2.7–10.2*	*0.1–3.2*	—

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Prevalence of enamel hypoplasia

Enamel hypoplasia is the most common abnormality of development and mineralisation of human teeth. Enamel hypoplasia in this Survey was recorded when there was hypoplasia that produced detectable loss of enamel. The assessment was based on visual criteria. Enamel hypoplasia was recorded if observed on deciduous, permanent dentitions or both dentitions. Children whose examination revealed any hypoplasia on dentition were classified as having hypoplasia.

In the Queensland child population aged 5–15 years, 13.1% of children had hypoplasia (Table 4.35). There was little variation among different population groups. The highest prevalence of hypoplasia was found in children living in the remote/very remote areas (19.2%). This prevalence was 1.6 times higher than that among children living in major cities (11.7%). There was no significant difference among population groups by sex, Indigenous identity, and parental country of birth, parental education, household income or reason for the last dental visit.

The youngest age group (children aged 5–6 years) had a lower prevalence (9.4%) than other groups, but the difference was only statistically significant in comparison to the 7–8 years age group (14.5%).

In summary, the prevalence of enamel hypoplasia was associated with residential location, with the highest prevalence shown among children living in remote/very remote areas.

Table 4.35: Percentage of children with any enamel hypoplasia in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**13.1**	**9.4**	**14.5**	**14.5**	**12.8**	**14.2**
	11.6–14.7	*7.4–11.9*	*12.0–17.4*	*11.8–17.7*	*10.3–15.7*	*10.8–18.4*
Sex						
Male	12.3	10.4	12.9	14.5	11.1	12.3
	10.6–14.2	*7.4–14.3*	*9.6–17.2*	*11.5–18.0*	*8.1–15.1*	*8.6–17.4*
Female	13.9	8.5	16.3	14.4	14.3	16.2
	12.0–15.9	*6.2–11.6*	*12.6–20.7*	*10.7–19.3*	*11.2–18.0*	*11.5–22.3*
Indigenous identity						
Non-Indigenous	12.9	9.4	14.2	14.8	12.7	13.3
	11.4–14.5	*7.3–12.0*	*11.8–17.0*	*11.9–18.3*	*10.3–15.7*	*9.8–17.8*
Indigenous	15.3	9.9	17.5	10.9	13.2	26.8
	11.4–20.2	*5.4–17.4*	*9.8–29.1*	*6.1–18.6*	*7.3–22.9*	*14.5–44.2*
Parent country of birth						
Australian born	13.3	9.7	13.8	16.2	12.3	14.5
	11.5–15.3	*7.4–12.5*	*10.9–17.5*	*12.4–20.8*	*9.5–15.8*	*10.7–19.2*
Overseas born	12.8	9.0	15.5	12.1	13.4	13.9
	11.0–14.8	*5.9–13.6*	*11.4–20.7*	*9.2–15.9*	*10.0–17.9*	*9.9–19.1*
Parental education						
School	13.1	6.7	14.1	18.3	11.1	15.1
	10.7–16.0	*3.8–11.5*	*9.4–20.5*	*12.8–25.5*	*7.9–15.4*	*10.1–22.0*
Vocational training	15.0	9.4	17.6	15.1	12.1	20.9
	12.2–18.3	*5.8–15.0*	*11.3–26.3*	*10.4–21.3*	*7.3–19.5*	*13.4–31.3*
Tertiary education	11.9	10.4	13.3	12.3	13.9	9.7
	10.4–13.8	*7.8–13.8*	*10.2–17.2*	*9.4–15.9*	*10.5–18.0*	*6.3–14.6*
Household income						
Low	14.2	10.6	17.1	16.7	13.8	12.6
	11.9–16.8	*6.9–16.0*	*11.9–24.0*	*12.2–22.5*	*10.3–18.2*	*8.2–19.0*
Medium	13.6	9.9	13.0	14.9	13.5	17.3
	11.6–15.9	*6.9–13.9*	*9.7–17.3*	*11.6–18.9*	*9.5–18.8*	*12.5–23.5*
High	11.2	7.3	15.0	11.4	11.1	10.8
	8.9–13.9	*4.0–13.1*	*9.8–22.3*	*7.0–17.9*	*7.1–16.9*	*5.6–19.5*
Residential location						
Major city	11.7	8.5	12.6	12.3	11.1	14.1
	9.9–13.8	*5.7–12.4*	*9.6–16.4*	*9.4–16.0*	*8.0–15.4*	*9.2–21.0*
Inner regional	11.3	6.8	13.5	11.1	10.7	14.3
	8.4–15.0	*3.9–11.8*	*8.8–20.2*	*7.6–16.1*	*6.8–16.4*	*6.7–27.9*
Outer regional	15.0	12.7	15.0	19.0	16.3	11.8
	11.7–19.0	*8.4–18.8*	*10.4–21.1*	*12.1–28.7*	*11.6–22.4*	*8.4–16.3*
Remote/Very remote	19.2	12.5	22.6	22.5	18.3	21.4
	14.7–24.7	*8.7–17.8*	*14.2–34.0*	*14.6–33.1*	*9.8–31.5*	*9.9–40.3*
Reason for last dental visit						
Check-up	13.1	8.7	15.3	13.3	12.8	14.2
	11.5–14.8	*6.4–11.7*	*12.6–18.4*	*10.7–16.5*	*10.1–16.2*	*10.6–18.6*
Dental problem	14.6	15.8	12.3	16.6	13.9	14.7
	12.0–17.7	*10.5–23.1*	*7.9–18.5*	*11.5–23.3*	*9.5–19.9*	*8.7–23.6*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Prevalence of non-fluorotic enamel opacity

Tooth enamel opacity may be caused by multiple conditions. It can be developmental or acquired. It may have an impact on tooth appearance and hence perceptions of dental appearance. Recording non-fluorotic enamel opacity is useful to differentiate such opacities or discolouration from opacity related to dental fluorosis, which has a defined cause. In the Survey, non-fluorotic opacity was examined on the buccal surface of the permanent maxillary central incisors. An opacity was differentiated from dental fluorosis based on Russell's differential diagnostic criteria (Russell 1961). Non-fluorotic opacity was recorded with a single score. This condition is reported among children aged 6 years and older (Table 4.36).

Non-fluorotic opacities were recorded in some 7.9% (95%CI: 6.5–9.5) of Queensland children aged 6–14 years. Across all ages combined, the highest prevalence of non-fluorotic opacities was observed among children from inner regional areas (10.3%) while the lowest prevalence was recorded among children residing in remote/very remote areas. However, the confidence intervals of the latter estimate were wide. Therefore, the difference was not statistically significant.

There were variations between subgroups by different characteristics and age groups. For example, children from high income households tended to have a lower prevalence of non-fluorotic opacities. However, none of the observed variations were statistically significant.

In summary, some 8% of Queensland children were observed as having some form of tooth enamel opacities that were not diagnosed as fluorotic opacities. Some variations appeared across subgroups but they did not reach statistical significance.

Table 4.36: Percentage of children with non-fluorotic enamel opacities in the Queensland child population

	Population: children aged 6–14 years			
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**7.9**	**5.8**	**8.6**	**8.6**
	6.5–9.5	*4.2–8.0*	*6.7–11.1*	*6.5–11.1*
Sex				
Male	7.5	4.9	8.6	8.1
	6.0–9.4	*3.2–7.4*	*6.4–11.4*	*5.5–11.9*
Female	8.3	6.7	8.7	9.0
	6.5–10.5	*4.0–10.9*	*6.3–11.8*	*6.5–12.3*
Indigenous identity				
Non-Indigenous	7.8	5.9	8.6	8.3
	6.5–9.4	*4.1–8.3*	*6.7–10.8*	*6.4–10.8*
Indigenous	8.9	4.9	9.5	11.6
	5.1–15.0	*1.7–13.4*	*3.9–21.2*	*5.2–23.8*
Parent country of birth				
Australian born	8.2	6.4	9.4	8.3
	6.6–10.1	*4.4–9.0*	*7.0–12.5*	*5.8–11.7*
Overseas born	7.4	5.0	7.6	8.9
	5.8–9.5	*2.9–8.5*	*5.5–10.5*	*6.2–12.6*
Parental education				
School	8.3	5.3	7.5	10.7
	6.2–10.9	*2.9–9.6*	*5.1–10.8*	*6.9–16.1*
Vocational training	8.0	10.6	6.4	7.9
	6.0–10.5	*6.7–16.5*	*4.0–9.9*	*4.7–13.1*
Tertiary education	7.7	4.5	9.8	7.5
	5.9–10.0	*2.7–7.4*	*6.7–14.2*	*5.3–10.5*
Household income				
Low	8.8	5.4	9.9	9.8
	6.9–11.2	*3.2–8.9*	*6.9–14.0*	*6.2–15.1*
Medium	8.1	5.9	8.6	9.1
	6.3–10.3	*3.9–8.9*	*6.1–12.1*	*6.3–13.0*
High	6.5	7.3	7.3	4.9
	4.4–9.4	*3.5–14.4*	*4.4–11.6*	*2.6–9.1*
Residential location				
Major city	8.6	5.7	9.0	10.5
	6.5–11.4	*3.6–8.9*	*6.2–12.8*	*7.3–14.8*
Inner regional	10.3	7.7	12.5	9.8
	7.1–14.6	*3.5–15.8*	*8.0–18.9*	*5.1–18.0*
Outer regional	5.9	5.5	5.9	6.2
	4.7–7.5	*3.3–8.9*	*4.0–8.7*	*4.1–9.4*
Remote/Very remote	3.9	—	6.5	—
	1.5–9.9	—	*2.3–17.2*	—
Reason for last dental visit				
Check-up	8.2	6.5	8.7	8.6
	6.6–10.0	*4.5–9.3*	*6.5–11.6*	*6.4–11.4*
Dental problem	7.3	5.3	8.1	7.8
	5.4–9.8	*2.9–9.4*	*5.3–12.3*	*4.5–13.4*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.
— Cell estimate suppressed due to low number of children.

The prevalence of any dental fluorosis

Dental fluorosis, a developmental condition of tooth enamel, is an effect of higher intake of fluoride in early childhood (Fejerskov et al. 1988). In the Survey, fluorosis was measured with the Thylstrup & Fejerskov (TF) Index for fluorosis (Fejerskov et al. 1988) on the two permanent maxillary central incisors. Dental fluorosis was differentiated from non-fluorotic discoloration by Russell's differential diagnostic criteria. Dental fluorosis presentation ranges from very fine white lines in the very mild form (TF score of 1), which was the most common level of severity in the Survey population, through to the whole tooth surface affected (TF score of 4) or with loss of enamel structure (pitting or chipping of the enamel) (TF score of 5), both of which are very rare in the Australian child population. Prevalence of any dental fluorosis combined all levels of fluorosis severity. The finding is reported among children aged 6 years and older (Table 4.37).

Overall, some 8.2% (95%CI: 7.0–9.5) of Queensland children aged 6–14 years had some level of dental fluorosis on their permanent maxillary central incisors. Across age groups, the prevalence was highest in children aged 9–11 years and lowest in the oldest age group. Across all subgroups, the highest prevalence was observed among children aged 9–11 years from families with medium household incomes (11.8%) and the lowest prevalence was among children of the same age group whose last dental visit was for a dental problem (4.5%).

There were variations in the prevalence of any dental fluorosis across different subgroups. For all ages combined, children whose last dental visit was for a dental problem had a significantly lower prevalence of any dental fluorosis than that of children whose last dental visit was for a check-up. That difference was also significant for children aged 9–11 years by the reason for the last dental visit.

The prevalence of any dental fluorosis was slightly higher among females, non-Indigenous children, and children residing in remote/very remote areas than their counterparts. However, none of these comparisons were statistically significant.

To summarise, the prevalence of any dental fluorosis in the Queensland child population was relatively low. There were no significant variations between socioeconomic groups and between geographic regions. The most notable association was observed between the prevalence of fluorosis and the reason for the last dental visit.

Table 4.37: Percentage of children with any dental fluorosis (having a TF score of 1 or higher) on their permanent maxillary central incisors in the Queensland child population

		Population: children aged 6–14 years		
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**8.2**	**9.0**	**9.9**	**5.7**
	7.0–9.5	*7.1–11.2*	*8.1–12.0*	*4.3–7.4*
Sex				
Male	7.6	7.3	10.8	4.0
	6.2–9.2	*4.7–11.0*	*8.5–13.6*	*2.6–6.2*
Female	8.8	10.6	8.9	7.4
	7.3–10.5	*8.1–13.8*	*6.7–11.6*	*5.1–10.4*
Indigenous identity				
Non-Indigenous	8.4	9.4	10.4	5.6
	7.2–9.8	*7.4–11.9*	*8.4–12.7*	*4.2–7.4*
Indigenous	5.7	4.5	5.3	7.2
	3.7–8.6	*1.9–10.0*	*2.8–9.9*	*3.3–14.8*
Parent country of birth				
Australian born	8.2	9.4	9.3	6.3
	6.9–9.8	*6.9–12.6*	*7.1–12.0*	*4.5–8.6*
Overseas born	8.1	8.4	10.7	4.8
	6.5–10.0	*5.8–12.0*	*8.2–13.8*	*3.0–7.5*
Parental education				
School	7.7	7.6	8.9	6.8
	6.1–9.8	*4.7–12.0*	*6.1–12.6*	*4.5–10.0*
Vocational training	8.3	10.5	11.6	2.7
	6.1–11.2	*6.4–16.7*	*8.0–16.5*	*1.2–5.9*
Tertiary education	8.4	9.3	9.7	6.2
	6.8–10.3	*6.5–13.1*	*7.3–12.7*	*4.4–8.8*
Household income				
Low	7.1	7.1	7.0	7.1
	5.5–9.0	*4.3–11.4*	*4.9–9.7*	*4.8–10.4*
Medium	8.8	9.1	11.8	5.4
	7.1–10.8	*6.4–12.7*	*8.8–15.6*	*3.6–8.1*
High	9.0	11.1	11.3	4.6
	6.5–12.2	*6.8–17.5*	*7.4–16.8*	*2.5–8.3*
Residential location				
Major city	8.1	8.1	11.5	4.2
	6.3–10.3	*5.7–11.3*	*8.7–14.9*	*2.7–6.5*
Inner regional	6.5	7.6	5.4	6.8
	4.3–9.7	*3.5–15.6*	*3.1–9.5*	*3.4–12.8*
Outer regional	8.9	11.0	10.4	6.1
	7.1–11.1	*7.1–16.7*	*7.4–14.4*	*4.0–9.3*
Remote/Very remote	10.2	10.9	9.6	10.3
	6.5–15.7	*6.2–18.5*	*4.8–18.4*	*4.9–20.4*
Reason for last dental visit				
Check-up	9.2	11.1	11.7	5.6
	7.8–10.8	*8.6–14.2*	*9.5–14.4*	*4.2–7.4*
Dental problem	5.2	4.8	4.5	6.5
	3.5–7.6	*2.3–9.9*	*2.9–7.0*	*3.1–13.2*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

The prevalence of more definitive dental fluorosis (TF score 3+)

There was a small proportion (0.4%) of children having more definitive dental fluorosis (TF score of 3 or higher) on their permanent maxillary incisors. More definitive dental fluorosis (moderate to severe) is fluorotic opacities that form cloud-like patches on significant proportions or whole area of the tooth surface. Children aged 9–11 years had the highest prevalence of more definitive dental fluorosis (0.8%) compared to younger or older age groups (0.2% and 0.2% respectively). However, the difference was not statistically significant.

There were variations between subgroups by different characteristics and age groups. For example, the children of overseas born parents, girls and Indigenous children tended to have higher prevalence of severe fluorosis. However, none of the observed variations were statistically significant due to the small number of observations.

Caution needed to be exercised when interpreting the results because only 24 children in the Queensland Survey sample were found to have a TF score of 3 or more. The estimates are not statistically reliable in a number of sub-groups.

Table 4.38: Percentage of children with more definitive dental fluorosis (having a TF score of 3 or higher) on their permanent maxillary central incisors in the Queensland child population

	Population: children aged 6–14 years			
Age (years)	**All ages**	**6–8**	**9–11**	**12–14**
All	**0.4**	**0.2**	**0.8**	**0.2**
	0.3–0.7	*0.0–0.8*	*0.5–1.4*	*0.1–0.6*
Sex				
Male	0.3	0.0	0.7	0.0
	0.1–0.7	—	*0.3–1.8*	—
Female	0.6	0.4	0.9	0.4
	0.3–1.0	*0.1–1.7*	*0.4–1.9*	*0.1–1.3*
Indigenous identity				
Non-Indigenous	0.4	0.2	0.8	0.2
	0.3–0.7	*0.0–0.9*	*0.4–1.4*	*0.1–0.7*
Indigenous	0.6	0.0	1.0	0.6
	0.2–2.1	—	*0.2–5.1*	*0.1–4.0*
Parent country of birth				
Australian born	0.3	0.3	0.4	0.1
	0.1–0.5	*0.0–1.5*	*0.1–1.0*	*0.0–0.4*
Overseas born	0.7	0.1	1.4	0.4
	0.4–1.2	*0.0–0.2*	*0.7–2.6*	*0.1–1.6*
Parental education				
School	0.4	0.0	0.6	0.4
	0.1–0.9	—	*0.2–1.9*	*0.1–2.1*
Vocational training	0.6	0.8	1.0	0.0
	0.2–1.7	*0.1–4.7*	*0.2–3.6*	—
Tertiary education	0.4	0.0	0.8	0.2
	0.2–0.8	*0.0–0.1*	*0.3–1.7*	*0.1–0.7*
Household income				
Low	0.3	0.0	0.7	0.1
	0.1–0.7	—	*0.2–1.8*	*0.0–0.3*
Medium	0.6	0.4	0.8	0.5
	0.3–1.1	*0.1–2.0*	*0.3–2.1*	*0.1–1.6*
High	0.4	0.0	1.0	0.0
	0.1–1.2	—	*0.3–2.9*	—
Residential location				
Major city	0.5	0.3	0.9	0.2
	0.3–0.9	*0.0–1.9*	*0.4–1.9*	*0.0–1.5*
Inner regional	0.0	0.0	0.0	0.0
	—	—	—	—
Outer regional	0.7	0.2	1.4	0.3
	0.3–1.5	*0.1–0.6*	*0.5–3.4*	*0.1–1.1*
Remote/Very remote	0.5	0.0	0.6	0.6
	0.1–1.9	—	*0.1–4.5*	*0.1–4.5*
Reason for last dental visit				
Check-up	0.5	0.2	0.8	0.2
	0.3–0.8	*0.0–1.3*	*0.4–1.6*	*0.1–0.8*
Dental problem	0.3	0.1	0.6	0.1
	0.1–0.9	*0.0–0.4*	*0.2–2.2*	*0.0–0.6*

Row 1: Mean scores.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

The prevalence of enamel opacities by four regions of Queensland

Prevalence of enamel opacity including any dental fluorosis, more definitive dental fluorosis and non-fluorotic opacities, showed some small variation between major regions (Table 4.39). The definitions of the three conditions were similar to that described in the previous tables.

The prevalence of any dental fluorosis across all ages was highest in Townsville and lowest in the South-East region. The difference between these two regions was statistically significant. The prevalence of any fluorosis between Townsville, the Northern region and Brisbane were not statistically significant. When individual age groups were considered, the difference in the prevalence of any dental fluorosis was statistically significant between children aged 9–11 years in Townsville and the South-East region.

The prevalence of more definitive dental fluorosis (having a TF score of 3 or more) was low and did not vary significantly between regions and age groups. The small number of children with more definitive dental fluorosis made some estimates not statistically reliable. There were six children (0.1%) across Queensland who had a TF score of 4 or 5 indicating moderate or severe dental fluorosis (data not shown). Three of those children were from the Brisbane area, and one from each of the other three regions.

The prevalence of non-fluorotic opacities across all ages was lowest in the Northern region, which was significantly lower than that of all other regions.

Table 4.39: Prevalence of enamel opacities in children by four regions of Queensland

		Population: children aged 6–14 years			
Major region		**Brisbane**	**South-East**	**Northern**	**Townsville**
Prevalence of any dental fluorosis					
All ages	**per cent**	**8.7**	**6.6**	**10.6**	**11.3**
	95%CI	*6.6–11.3*	*4.9–8.7*	*8.1–13.8*	*9.6–13.2*
6–8 years	per cent	8.3	7.4	12.5	14.9
	95%CI	*5.5–12.2*	*4.8–11.1*	*7.9–19.2*	*11.6–18.9*
9–11 years	per cent	12.0	7.9	10.9	13.1
	95%CI	*8.5–16.6*	*5.5–11.2*	*7.4–15.6*	*10.5–16.1*
12–14 years	per cent	5.4	4.6	8.9	7.3
	95%CI	*3.1–9.1*	*2.9–7.3*	*5.0–15.0*	*4.9–10.8*
Prevalence of more definitive dental fluorosis					
All ages	**per cent**	**0.6**	**0.3**	**0.5**	**0.8**
	95%CI	*0.3–1.2*	*0.1–0.7*	*0.2–1.4*	*0.4–1.8*
6–8 years	per cent	—	0.3	—	0.7
	95%CI	—	*0.0–2.2*	—	*0.2–2.2*
9–11 years	per cent	1.2	0.5	0.9	0.7
	95%CI	*0.5–2.8*	*0.2–1.6*	*0.3–2.8*	*0.3–1.7*
12–14 years	per cent	0.3	—	0.3	1.0
	95%CI	*0.1–2.3*	—	*0.0–2.0*	*0.2–4.5*
Prevalence of non-fluorotic opacity					
All ages	**mean**	**8.0**	**9.5**	**2.9**	**9.6**
	95%CI	*5.3–11.8*	*7.5–12.0*	*1.6–5.1*	*7.9–11.5*
6–8 years	mean	6.5	6.0	3.1	9.8
	95%CI	*3.6–11.2*	*3.5–9.9*	*1.1–8.9*	*7.1–13.3*
9–11 years	mean	10.1	9.5	3.8	8.8
	95%CI	*6.5–15.5*	*6.5–13.5*	*1.9–7.4*	*6.7–11.4*
12–14 years	mean	6.7	11.9	1.5	10.3
	95%CI	*3.7–12.0*	*8.6–16.3*	*0.5–4.2*	*7.2–14.4*

Opacities were assessed on maxillary central incisors.
Any dental fluorosis: TF score 1+; More definitive dental fluorosis: TF score 3+.
Per cent: Per cent of children.
95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Summary of other conditions

Around 8% of children had dental trauma in their permanent dentition. Almost 8% of children had mucosal lesions such as ulcerated and non-ulcerated mucosal conditions. Nearly 2% of children had an odontogenic abscess.

Findings from six of the preceding tables are summarised in Tables 4.40 and 4.41. Dental trauma increased by age groups, and was also less prevalent among girls. Oral mucosal lesions were more prevalent among children aged 9–10 and 11–12 years. More odontogenic abscesses were found among children whose last dental visit was for a dental problem. In contrast, less fluorosis was found among children whose last dental visit was for a dental problem.

Table 4.40: Summary of oral mucosal conditions and trauma in the Queensland child population, aged 5–14 years

	Trauma	Mucosal lesions	Odontogenic abscess	Hypoplasia
	% people	% people	% people	% people
Age				
5–6 years	Ref	Ref	Ref	Ref
7–8 years				↑
9–10 years	↑	↑		
11–12 years	↑	↑	↓	
13–14 years	↑			
Sex				
Male	Ref	Ref	Ref	Ref
Female	↓			
Indigenous identity				
Non-Indigenous	Ref	Ref	Ref	Ref
Indigenous				
Parent country of birth				
Australian born	Ref	Ref	Ref	Ref
Overseas born				
Parental education				
School	Ref	Ref	Ref	Ref
Vocational training				
Tertiary education				
Household income				
Low	Ref	Ref	Ref	Ref
Medium				
High				
Residential location				
Major city	Ref	Ref	Ref	Ref
Inner regional				
Outer regional				
Remote/Very remote				↑
Reason for last dental visit				
Check-up	Ref	Ref	Ref	Ref
Dental problem	↑		↑	

Ref=Reference group.
Symbols: ↓↓ Markedly lower; ↓ Lower; Not sig. different; ↑ Higher; ↑↑ Markedly higher.

Table 4.41: Summary of fluorotic and non-fluorotic lesions in the Queensland child population

	Population: children aged 6 years	
	Fluorosis	Non-fluorotic lesions
	% people	% people
Age		
6–8 years	Ref	Ref
9–11 years		
12–14 years		
Sex		
Male	Ref	Ref
Female		
Indigenous identity		
Non-Indigenous	Ref	Ref
Indigenous		
Parent country of birth		
Australian born	Ref	Ref
Overseas born		
Parental education		
School	Ref	Ref
Vocational training		
Tertiary education		
Household income		
Low	Ref	Ref
Medium		
High		
Residential location		
Major city	Ref	Ref
Inner regional		
Outer Regional		
Remote/Very remote		
Reason for last dental visit		
Check-up	Ref	Ref
Dental problem	↓	

Ref=Reference group.
Symbols: ↓↓ Markedly lower; ↓ Lower; Not sig. different; ↑ Higher; ↑↑ Markedly higher.

Prevalence of children with self-rated oral health as 'Excellent' or 'Very good'

The child's parent was asked 'How would you rate the current dental health of your child?' Parents were able to answer 'Excellent', 'Very good', 'Good' 'Fair' or 'Poor'. Table 4.42 shows the percentage of parents who gave a high rating of 'Excellent' or 'Very good'.

More than half (55.1%) of parents of children of all ages rated the dental health of their child as 'Excellent' or 'Very good'. The percentage of high ratings decreased significantly across age groups to 47.3% among children aged 9–10 years, with the biggest decrease (9.7%) seen in children aged 5–6 years (65.3%) to children aged 7–8 years (55.6%). The percentage with a high rating then increased among ages 11–12 years (51.2%) and among ages 13–14 years (55.8%). There was no significant difference between any of the age groups.

The highest percentage of a high parental rating of oral health among different populations was seen in the high household income population group (69.3%). Parents of children whose last visit was due to a dental problem had the lowest percentage of ratings of 'Excellent' or 'Very good' (31.4%) for the oral health of their child.

Among children of all ages, there were significant differences between Indigenous children (43.7%) and non-Indigenous children (56.0%). Children whose parents had some tertiary education (61.1%) or vocational level training (55.5%) had a higher rating of oral health as 'Excellent' or 'Very good' than children whose parents had only school-level education (44.9%). Children from low income households had a significantly lower percentage rating of oral health as 'Excellent' or 'Very good' (43.8%) compared with children from medium and high income households (58.0% and 69.3% respectively). The difference between medium and high income households was also significant. Children who reported their last dental visit was for a check-up had nearly double the percentage of rating oral health as 'Excellent' or 'Very good' (61.5%) than children who reported their last dental visit was for a dental problem (31.4%).

There were no significant differences among groups by sex, parents' country of birth and residential location.

In summary, 'Excellent' or 'Very good' self-rated oral health was consistently associated with parental education, household income and reason for last dental being a check-up among all age groups. The differences in rating oral health as 'Excellent' or 'Very good' among low household income children and high income households increased across age groups, from 1.4 times in children aged 5–6 years to 1.8 times in those aged 13–14 years. The biggest difference (2.3 times) in self-rated oral health was found among children aged 9–10 years whose last visit was for a dental check-up or for a dental problem.

Table 4.42: Percentage of children with self-rated oral health as 'Excellent' or 'Very good'

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**55.1**	**65.3**	**55.6**	**47.3**	**51.2**	**55.8**
	52.9–57.2	*61.6–68.8*	*51.4–59.8*	*43.6–50.9*	*47.4–55.0*	*51.3–60.1*
Sex						
Male	53.4	65.1	53.9	48.1	50.6	49.7
	50.5–56.2	*60.8–69.1*	*48.1–59.6*	*43.8–52.5*	*45.3–55.8*	*43.1–56.2*
Female	56.9	65.4	57.5	46.2	51.8	62.4
	54.1–59.6	*60.1–70.4*	*51.9–62.9*	*40.9–51.5*	*47.1–56.5*	*55.2–69.0*
Indigenous identity						
Non-Indigenous	56.0	66.5	56.9	47.5	52.4	56.4
	53.8–58.1	*62.8–69.9*	*52.4–61.2*	*43.6–51.4*	*48.6–56.1*	*51.8–60.9*
Indigenous	43.7	48.4	41.9	44.9	36.9	46.9
	36.1–51.6	*34.0–63.0*	*30.5–54.3*	*31.8–58.6*	*25.3–50.1*	*32.2–62.1*
Parent country of birth						
Australian born	55.0	66.6	54.9	47.6	51.1	54.3
	52.5–57.5	*61.6–71.3*	*49.3–60.5*	*42.8–52.4*	*46.2–56.1*	*48.3–60.2*
Overseas born	55.1	63.2	56.6	46.7	51.4	57.7
	52.2–58.0	*57.8–68.2*	*51.0–62.1*	*41.5–52.0*	*46.3–56.4*	*51.3–63.9*
Parental education						
School	44.9	54.0	49.0	36.5	38.2	46.3
	41.6–48.3	*45.9–61.9*	*41.9–56.2*	*30.5–43.0*	*32.1–44.6*	*37.8–55.0*
Vocational training	55.5	69.7	52.2	44.1	53.3	57.1
	51.8–59.1	*61.4–76.9*	*45.0–59.3*	*36.8–51.6*	*45.9–60.6*	*46.5–67.1*
Tertiary education	61.1	69.6	61.3	53.8	57.5	63.2
	58.4–63.7	*64.2–74.5*	*55.0–67.1*	*48.8–58.7*	*53.0–62.0*	*56.8–69.2*
Household income						
Low	43.8	55.1	49.8	36.6	38.4	40.8
	40.6–47.1	*48.7–61.4*	*43.5–56.1*	*31.3–42.2*	*31.9–45.4*	*33.5–48.5*
Medium	58.0	68.0	54.6	51.4	54.5	60.0
	55.3–60.6	*63.1–72.5*	*48.1–61.0*	*46.3–56.6*	*49.9–58.9*	*53.0–66.7*
High	69.3	78.9	68.1	60.6	65.8	72.8
	65.5–72.8	*71.9–84.6*	*59.6–75.6*	*53.5–67.2*	*58.9–72.2*	*62.4–81.2*
Residential location						
Major city	57.4	65.9	58.8	52.5	51.9	57.0
	54.5–60.1	*61.0–70.5*	*52.9–64.4*	*47.3–57.7*	*46.6–57.3*	*50.2–63.6*
Inner regional	51.8	66.8	52.1	41.9	49.3	48.0
	46.1–57.5	*57.7–74.8*	*39.9–64.0*	*34.0–50.1*	*39.5–59.2*	*38.0–58.1*
Outer regional	55.2	70.5	54.1	40.2	49.5	63.3
	51.6–58.9	*63.0–77.1*	*47.0–61.0*	*32.7–48.2*	*44.0–54.9*	*56.4–69.8*
Remote/Very remote	49.0	47.1	52.3	44.8	55.3	44.8
	39.8–58.3	*32.9–61.7*	*38.6–65.6*	*32.6–57.5*	*37.2–72.2*	*28.0–63.0*
Reason for last dental visit						
Check-up	61.5	74.4	62.7	55.6	56.7	61.4
	59.1–63.7	*70.4–78.1*	*57.6–67.6*	*51.6–59.6*	*52.4–60.9*	*56.5–66.1*
Dental problem	31.4	34.1	35.5	24.6	32.6	32.2
	28.1–34.9	*26.2–43.1*	*28.6–43.1*	*19.4–30.8*	*26.2–39.7*	*23.8–41.9*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

5. Use of dental services

By Katie Beckwith, Carmen Koster and Diep Ha

Several approaches were used to describe the use of dental services among child populations. While the most common approaches were focussed on recent dental visiting behaviour, other useful approaches look at the child's usual visiting patterns and the first dental visit to reflect longer term behaviour. This chapter uses all three approaches, and additionally considers parent satisfaction with the care their child received at their most recent dental visit.

5.1 Children's first dental visit

The child's first dental visit is characterised by the age of the child at their first dental visit and the reason for the first visit.

5.1.1 Age of child

The age at which a child first visits a dental provider gives insight into the establishment of a pattern of visiting. It is also an indicator of a preference for seeking problem-related care or preventive care.

Two years of age or younger

The child's parent was asked 'How old was your child when he/she first visited a dentist or oral health therapist for general dental care for his/her own oral health?' Parents were able to answer: 'under one year old', 'one year of age', 'two years of age', 'three years of age', four years of age', 'five years of age', six years of age', 'aged 7 or older' or 'never visited for general dental care'. Table 5.1 presents the percentage of children visiting a dentist or oral health therapist before or at the age of two in the Queensland child population (aged 5–14 years).

One-fifth of Queensland children aged 5–14 years visited a dental provider before or at the age of 2 years (Table 5.1). There was little variation across age groups in the percentage of children visiting a dental provider before or at the age of 2 (19.2% to 21.2%).

For children of all ages, the population group with the highest percentage of children visiting a dental provider before or at the age of 2 years was from the high income household group (28.9%). The children of parents with only school-level education had the lowest percentage (12.9%).

Among the different population groups, the percentage of children who visited a dental provider before or at the age of 2 years was 1.5 times higher among non-Indigenous children (20.5%) than Indigenous children (13.3%). Parents with some tertiary education took their children to visit a dental provider for the first time before or at the age of 2 years (26.0%) more than parents with only school-level education (12.9%) or some vocational training (14.4%). These differences were statistically significant. The differences between all three household income groups were statistically significant. Parents from high income households had the highest percentage of children visiting a dental provider before or at the age of 2 years (28.9%) followed by the medium household income group (20.6%) and the low household income group (13.6%).Parents who reported last taking their child to a dental provider for a dental problem had a significantly lower

percentage of taking children to visit a dental provider before or at the age of 2 years (17.3%) than those whose reported the child's last visit was for a check-up (23.2%). Parents from major cities took their children to visit a dental provider before or at the age of 2 years more than parents from other areas. The difference was statistically significant between the major cities group (21.8%) and remote/very remote group (14.7%). There were no significant differences among groups by sex or parental country of birth.

The largest differences were seen among parental education groups and household income groups. Across parental education groups among parents of children aged 5–6 years, parents with some tertiary education had a 2.8 times higher percentage of children visiting a dental provider before or at the age of 2 years (26.4%) than parents with only school-level education (9.4%), and a 2.3 times higher percentage than parents with some vocational training (11.6%). Statistically significant differences were seen in the 7–8 years age group and the 9–10 years age group, but not in other age groups. For household income groups, statistically significant differences were seen between high income households and low income households among children aged 5–6 years (2.0-fold), 7–8 years (2.3-fold), 9–10 years (2.4-fold), and 11–12 years (1.9-fold). Across Indigenous groups, parents of non-Indigenous children had a higher percentage of the child visiting before or at the age of 2 years than parents of Indigenous children, but a significant difference only in the 5–6 years age group.

In summary, children who were more likely to have visited a dental provider before or at 2 years of age were non-Indigenous, children of parents with some tertiary education, children from high income households, who lived in major cities and whose last dental visit was for a dental check-up.

Table 5.1: Percentage of children who first visited a dental provider at or before the age of 2 years in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**20.0**	**19.2**	**21.2**	**20.4**	**20.7**	**18.4**
	18.5–21.5	*16.8–21.8*	*18.2–24.6*	*17.4–23.7*	*18.0–23.7*	*15.4–21.8*
Sex						
Male	19.5	18.1	17.2	22.5	20.9	18.8
	17.5–21.7	*14.5–22.3*	*13.7–21.3*	*18.6–27.0*	*17.2–25.2*	*14.6–23.9*
Female	20.4	20.2	25.8	17.8	20.5	18.0
	18.5–22.5	*16.7–24.2*	*20.9–31.2*	*13.9–22.4*	*16.9–24.7*	*13.4–23.7*
Indigenous identity						
Non-Indigenous	20.5	19.6	21.8	21.6	21.2	18.5
	19.0–22.0	*17.2–22.2*	*18.6–25.3*	*18.6–24.9*	*18.3–24.3*	*15.5–22.0*
Indigenous	13.3	13.4	15.0	7.9	14.7	16.9
	9.3–18.6	*6.6–25.1*	*8.0–26.4*	*2.7–21.0*	*7.2–27.5*	*8.1–32.0*
Parent country of birth						
Australian born	20.0	19.3	22.7	20.9	20.4	16.7
	18.1–22.0	*16.2–22.8*	*18.6–27.4*	*17.0–25.4*	*16.9–24.3*	*13.1–21.1*
Overseas born	19.9	19.0	19.1	19.7	21.2	20.7
	17.7–22.4	*14.5–24.5*	*14.8–24.2*	*15.4–24.8*	*16.8–26.4*	*15.6–26.9*
Parental education						
School	12.9	9.4	13.6	10.3	15.5	14.6
	10.7–15.4	*5.8–14.9*	*9.9–18.4*	*7.0–15.0*	*11.4–20.7*	*9.9–21.0*
Vocational training	14.4	11.6	11.2	16.3	18.6	15.1
	11.9–17.4	*7.1–18.3*	*7.3–16.7*	*11.9–21.9*	*13.4–25.2*	*9.6–22.9*
Tertiary education	26.0	26.4	28.9	27.4	23.5	23.5
	23.9–28.1	*22.6–30.6*	*24.1–34.2*	*22.6–32.8*	*19.6–27.9*	*18.8–29.0*
Household income						
Low	13.6	13.1	14.1	13.6	14.3	13.1
	11.5–16.0	*9.7–17.4*	*10.5–18.6*	*9.1–19.7*	*10.6–19.0*	*9.3–18.2*
Medium	20.6	20.7	21.5	20.9	21.5	18.3
	18.7–22.6	*16.9–25.0*	*17.4–26.4*	*17.1–25.5*	*17.4–26.4*	*13.6–24.2*
High	28.9	26.0	31.9	32.0	27.6	27.1
	25.0–33.2	*19.8–33.3*	*23.7–41.4*	*25.1–39.8*	*21.5–34.7*	*17.8–38.9*
Residential location						
Major city	21.8	19.3	23.0	22.0	23.7	21.2
	19.6–24.2	*16.1–23.1*	*19.0–27.5*	*18.0–26.7*	*19.5–28.6*	*16.5–26.8*
Inner regional	18.9	22.1	17.0	19.0	18.2	18.2
	16.3–21.8	*16.4–29.1*	*11.2–25.0*	*12.3–28.2*	*12.9–25.1*	*13.0–24.8*
Outer regional	18.6	18.0	20.0	20.6	18.3	16.4
	16.4–21.1	*13.6–23.4*	*15.5–25.4*	*16.0–26.1*	*14.1–23.4*	*12.0–22.1*
Remote/Very remote	14.7	15.3	21.9	11.6	16.4	5.0
	11.0–19.3	*10.1–22.4*	*11.0–38.7*	*5.6–22.5*	*9.6–26.6*	*1.5–15.9*
Reason for last dental visit						
Check-up	23.2	29.6	23.9	22.8	21.8	20.1
	21.5–25.1	*25.7–33.8*	*20.2–28.2*	*19.1–27.0*	*18.4–25.6*	*16.7–24.0*
Dental problem	17.3	22.6	20.5	14.6	19.2	11.4
	14.9–20.1	*15.4–31.8*	*14.9–27.5*	*10.5–19.9*	*14.0–25.7*	*6.9–18.1*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Never visited for dental care

Table 5.2 presents the percentage of the Queensland child population aged 5–14 years who had never visited a dentist or dental therapist. This table is based on the same question as per Table 5.1.

There were 9.0% of children who had never visited a dental provider among the Queensland child population aged 5–14 years. The percentage decreased across age groups, with 31.9% of children aged 5–6 years reporting to have never visited a dental provider, decreasing to 0.4% of children aged 13–14 years. The biggest changes in the percentage of children who had never visited a dental provider were between the ages 5–6 years (31.9%) and 7–8 years (8.2%).

For children of all ages, the highest percentage of children who had never visited a dental provider had parents with only school-level education (12.5%). The high household income group had the lowest percentage (5.2%).

Across different social characteristics, significant differences were seen between parental education and household income groups. Children whose parents had some tertiary education reported never having visited a dental provider (6.8%) less than those whose parents had only school-level education (12.5%) or whose parents had some vocational training (10.2%). The difference was statistically significant between children whose parents had some tertiary education and those with only school-level education. Children from low income households had the highest percentage reporting that they had never visited a dental provider (11.5%) followed by those from the medium income household (8.6%) and those in the high income household (5.2%) groups. The difference was statistically significant between high and low income household groups.

There were no significant differences between children by sex, Indigenous identity, parent country of birth and residential location.

Among different age groups, the largest differences in percentage of children who had never visited a dental provider were seen across parental education groups. The difference between children whose parents had some tertiary education and those whose parents had only school-level education was largest among children aged 9–10 years (7.0-fold) followed by children aged 7–8 years (3.1-fold) and those aged 5–6 years (1.7-fold). The percentage of children who had never visited a dental provider among children from low income households was consistently higher than children from high income households across all age groups but was statistically significant only in the 5–6 years age group.

In summary, for indicators of an advantaged background such as children whose parents had some tertiary education and children of high income households, a lower percentage of children had never visited a dental provider. The percentage decreased among children across older age groups.

Table 5.2: Percentage of children who have never visited a dental provider in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**9.0**	**31.9**	**8.2**	**1.7**	**2.6**	**0.4**
	7.8–10.5	*27.9–36.2*	*5.9–11.2*	*1.0–3.0*	*1.7–3.9*	*0.1–1.4*
Sex						
Male	8.8	32.7	7.8	1.5	2.2	0.5
	7.4–10.6	*27.4–38.5*	*5.1–11.7*	*0.6–3.7*	*1.2–4.1*	*0.1–2.8*
Female	9.3	31.2	8.6	2.0	2.9	0.3
	7.7–11.1	*26.3–36.5*	*5.9–12.4*	*1.0–3.9*	*1.7–4.9*	*0.0–2.0*
Indigenous identity						
Non-Indigenous	9.0	31.8	8.0	1.8	2.6	0.4
	7.8–10.5	*27.8–36.0*	*5.8–10.9*	*1.0–3.2*	*1.7–4.1*	*0.1–1.5*
Indigenous	9.2	34.5	10.0	1.2	2.0	0.0
	6.1–13.6	*22.1–49.4*	*4.3–21.6*	*0.3–5.2*	*0.3–11.2*	—
Parent country of birth						
Australian born	8.8	32.7	6.0	1.8	2.0	0.4
	7.3–10.6	*27.6–38.1*	*3.7–9.6*	*0.8–3.9*	*1.1–3.6*	*0.1–2.4*
Overseas born	9.4	30.9	11.3	1.6	3.4	0.3
	7.8–11.3	*25.2–37.1*	*7.7–16.3*	*0.8–3.4*	*1.8–6.1*	*0.1–2.3*
Parental education						
School	12.5	42.4	15.3	4.2	3.8	1.1
	9.7–16.1	*33.6–51.6*	*9.9–22.9*	*1.9–9.2*	*1.9–7.3*	*0.3–4.3*
Vocational training	10.2	37.7	6.8	1.0	2.7	0.0
	8.1–12.8	*30.0–46.1*	*3.8–12.0*	*0.4–2.5*	*1.0–7.1*	—
Tertiary education	6.8	25.5	4.9	0.6	1.6	0.1
	5.7–8.1	*21.3–30.3*	*3.0–7.8*	*0.2–1.5*	*0.7–3.5*	*0.0–0.4*
Household income						
Low	11.5	40.6	10.0	3.0	5.4	0.6
	8.9–14.7	*32.8–48.9*	*6.2–15.8*	*1.5–6.2*	*3.2–8.9*	*0.1–4.3*
Medium	8.6	30.5	7.9	0.7	0.9	0.3
	7.2–10.3	*25.4–36.1*	*5.2–12.0*	*0.3–1.7*	*0.3–2.5*	*0.1–2.3*
High	5.2	20.9	4.1	1.0	0.7	0.0
	3.8–7.3	*14.8–28.7*	*1.8–8.7*	*0.3–3.2*	*0.1–4.0*	—
Residential location						
Major city	9.2	31.5	7.2	1.3	3.6	0.7
	7.4–11.4	*25.8–37.8*	*4.6–11.1*	*0.6–2.9*	*2.1–5.9*	*0.2–3.0*
Inner regional	9.1	33.6	5.8	3.2	2.2	0.0
	6.5–12.5	*24.8–43.8*	*2.1–15.3*	*1.0–9.6*	*0.8–6.0*	—
Outer regional	7.8	30.7	8.7	1.6	1.7	0.1
	6.2–9.7	*23.8–38.5*	*3.9–18.4*	*0.7–3.3*	*0.7–3.8*	*0.0–0.7*
Remote/Very remote	11.4	32.9	15.1	1.7	0.0	0.0
	8.8–14.7	*22.7–44.9*	*8.6–25.2*	*0.5–5.7*	—	—
Reason for last dental visit[a]						
Check-up	0.0	0.0	0.0	0.0	0.0	0.0
	—	—	—	—	—	—
Dental problem	0.0	0.0	0.0	0.0	0.0	0.0
	—	—	—	—	—	—

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.
[a]There is no summary data for reason for last dental visit, as table presents data for those who have never visited a dental provider.

5.1.2 Reason for first visit

The reason for seeking dental care for the child influences the type of care they are likely to receive and the level of untreated problems the child may have at any time. Children who visit only if they are experiencing a dental problem may be less likely to receive preventive services and may experience greater levels of untreated oral disease.

Check-up

Parents were asked 'What was the reason for your child's first visit to a dentist or oral health therapist for his/her own oral health?'. Possible responses were 'check-up', 'relief of pain', 'problem' or 'other'. Table 5.3 shows the percentage of children who first visited a dental provider for a check-up.

Over 85% of children reportedly had their first dental visit for a check-up. The percentage increased slightly across age groups. Of children aged 5–6 years, 80% were reported to have had their first dental visit for a check-up. This increased to 89.6% among children aged 11–12 years. Over 87% of children aged 13–14 years reportedly had their first dental visit for a check-up. The percentage was significantly higher among children aged 11–12 (89.6%) and 13–14 years (87.3%) than among those aged 5–6 years (80.0%).

Children from a non-Indigenous background (85.7%) were significantly more likely to have had their first dental visit for a check-up than children from an Indigenous background (78.5%). Across age groups, the proportion of children whose first dental visit was a check-up tended to be higher in the older age groups than younger ages groups for both Indigenous and non-Indigenous children.

A higher percentage of children whose parents had some vocational training (86.8%) or some tertiary education (87.7%) visited for a check-up at their first dental visit than those children whose parents had only school-level education (79.5%).

More children from medium (86.9%) and high (91.2%) income households visited for a check-up during their first dental visit than children from low income households (80.5%). There were no significant differences by sex, parents' country of birth or residential location.

Overall, the older age groups of children had a higher probability that their first dental visit was for a check-up. Groups that were less likely to have visited for a dental check-up at their first visit were children from an Indigenous background, children whose parents' highest educational achievement was only school-level, children from a low income household and those whose last visit was for a dental problem. The findings indicate that children from a disadvantaged background were less likely to attend a dental provider for a check-up at their first dental visit.

Table 5.3: Percentage of children who first visited a dental provider for a check-up in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**85.2**	**80.0**	**82.0**	**85.2**	**89.6**	**87.3**
	83.8–86.5	*76.2–83.4*	*78.4–85.2*	*82.6–87.4*	*87.3–91.5*	*84.4–89.7*
Sex						
Male	84.9	78.5	81.1	85.8	90.6	86.3
	82.7–86.8	*73.1–83.1*	*75.3–85.8*	*82.0–88.9*	*87.2–93.1*	*81.7–89.9*
Female	85.6	81.5	83.1	84.4	88.7	88.3
	83.8–87.1	*76.4–85.7*	*79.0–86.6*	*80.7–87.5*	*85.4–91.3*	*83.6–91.8*
Indigenous identity						
Non-Indigenous	85.7	81.2	82.5	86.2	89.9	87.2
	84.3–87.1	*77.4–84.6*	*78.5–85.8*	*83.6–88.5*	*87.5–91.9*	*84.2–89.7*
Indigenous	78.5	62.7	77.4	73.8	85.9	88.5
	71.5–84.1	*45.5–77.2*	*63.4–87.2*	*62.1–82.8*	*75.7–92.2*	*75.8–94.9*
Parent country of birth						
Australian born	86.0	80.9	83.0	86.2	90.1	88.2
	84.2–87.6	*75.7–85.1*	*77.9–87.0*	*83.0–88.8*	*87.1–92.5*	*84.3–91.3*
Overseas born	84.1	78.9	80.6	83.8	88.9	86.1
	81.8–86.1	*73.2–83.6*	*75.5–84.9*	*79.8–87.1*	*85.1–91.8*	*80.4–90.3*
Parental education						
School	79.5	71.4	76.0	79.6	82.9	82.5
	76.3–82.3	*62.1–79.2*	*68.2–82.5*	*74.0–84.3*	*77.7–87.1*	*75.4–87.9*
Vocational training	86.8	81.3	80.1	89.4	87.8	92.9
	84.0–89.2	*72.7–87.7*	*71.9–86.3*	*84.4–92.9*	*82.2–91.8*	*87.7–96.0*
Tertiary education	87.7	83.2	86.1	86.1	93.4	88.5
	85.7–89.4	*78.0–87.3*	*81.3–89.8*	*82.2–89.2*	*90.9–95.3*	*83.2–92.3*
Household income						
Low	80.5	69.0	81.5	77.8	86.5	83.6
	77.9–83.0	*60.9–76.0*	*76.0–85.9*	*73.0–82.0*	*81.8–90.1*	*77.4–88.4*
Medium	86.9	84.4	81.8	88.5	90.6	88.3
	85.0–88.6	*79.5–88.3*	*75.4–86.8*	*85.0–91.3*	*87.1–93.2*	*83.4–91.9*
High	91.2	85.3	88.3	93.1	92.2	95.9
	88.4–93.4	*76.0–91.5*	*80.6–93.2*	*87.8–96.2*	*86.6–95.6*	*90.0–98.4*
Residential location						
Major city	85.0	81.3	82.8	83.8	90.3	86.0
	83.0–86.9	*75.9–85.7*	*77.7–86.9*	*79.7–87.2*	*86.8–93.0*	*80.7–90.1*
Inner regional	84.9	82.2	80.2	84.2	90.2	86.0
	81.5–87.7	*75.0–87.7*	*69.9–87.6*	*77.2–89.3*	*81.8–94.9*	*79.5–90.7*
Outer regional	88.2	78.2	87.3	88.7	90.1	92.1
	85.9–90.1	*69.8–84.8*	*82.7–90.8*	*83.8–92.3*	*86.0–93.1*	*87.9–95.0*
Remote/Very remote	79.0	73.4	65.2	85.1	85.2	85.0
	72.7–84.2	*59.0–84.1*	*47.0–79.9*	*75.1–91.6*	*75.5–91.5*	*66.4–94.2*
Reason for last dental visit						
Check-up	90.0	91.2	88.5	90.5	91.5	88.4
	88.7–91.1	*88.3–93.4*	*84.9–91.3*	*87.8–92.6*	*89.0–93.5*	*85.0–91.1*
Dental problem	68.1	36.0	61.9	69.3	82.5	82.2
	64.2–71.7	*27.0–46.1*	*54.1–69.2*	*62.4–75.4*	*76.2–87.3*	*75.1–87.6*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Problem

Table 5.4 shows the percentage of children who first visited a dentist for either 'relief of pain' or 'problem', and relates to the same question as Table 5.3.

In total, 14.3% of children visited a dental provider for a problem at their first visit. The percentage tended to decrease across age groups, from 18.9% among children aged 5–6 years to 12.6% among those aged 13–14 years. Among children aged 11–12 years, the percentage was significantly lower (10.1%) than among other age groups.

More children from an Indigenous background (20.7%) visited for a problem at their first dental visit than those children from a non-Indigenous background (13.8%).

Significant differences were seen between groups of children defined by levels of parental education. Children whose parents had some vocational training (12.4%) or some tertiary education (11.8%) were less likely to have visited for a problem than children of parents with only school-level education (20.3%).

For children of all ages, the highest percentage of children whose first visit to a dental provider was for a problem were children from low income households (19.4%). This was compared to significantly lower percentages among children from medium (12.6%) and high income households (7.8%). No significant differences in the first visit being for a problem were found between children defined by sex, parents' country of birth and residential location.

When comparing the reason for first and last dental visit for a problem, 31.5% of children whose last visit was for a problem also visited for a problem at their first dental visit. A significantly lower percentage (9.6%) of children who last visited for a problem attended their first dental visit for a check-up.

In summary, socially disadvantaged children such as those from an Indigenous background, children whose parents had only school-level education and those from low income households were more likely to visit for a problem at their first visit to a dental provider.

Table 5.4: Percentage of children who first visited a dental provider for a problem in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**14.3**	**18.9**	**17.1**	**14.7**	**10.1**	**12.6**
	13.0–15.8	*15.5–22.7*	*14.0–20.6*	*12.4–17.2*	*8.2–12.4*	*10.1–15.5*
Sex						
Male	14.7	20.6	17.5	14.1	9.1	13.7
	12.8–16.8	*16.0–26.1*	*13.0–23.1*	*11.0–17.9*	*6.7–12.3*	*10.1–18.3*
Female	14.0	17.2	16.6	15.3	11.1	11.4
	12.4–15.7	*13.3–21.9*	*13.2–20.6*	*12.3–19.0*	*8.5–14.4*	*7.9–16.1*
Indigenous identity						
Non-Indigenous	13.8	17.6	16.9	13.6	9.8	12.6
	12.5–15.2	*14.3–21.4*	*13.6–20.8*	*11.3–16.2*	*7.9–12.1*	*10.1–15.7*
Indigenous	20.7	37.3	19.0	26.1	14.1	11.5
	15.3–27.5	*22.8–54.6*	*10.5–32.1*	*17.0–37.7*	*7.8–24.3*	*5.1–24.2*
Parent country of birth						
Australian born	13.6	18.3	16.1	13.7	9.7	11.7
	12.0–15.3	*14.1–23.4*	*12.1–21.0*	*11.0–16.8*	*7.3–12.7*	*8.7–15.7*
Overseas born	15.4	19.7	18.7	16.0	10.8	13.7
	13.4–17.7	*15.1–25.4*	*14.5–23.7*	*12.7–20.0*	*7.9–14.6*	*9.5–19.3*
Parental education						
School	20.3	28.6	22.8	20.4	17.1	17.5
	17.5–23.5	*20.8–37.9*	*16.5–30.6*	*15.7–26.0*	*12.9–22.3*	*12.1–24.6*
Vocational training	12.4	17.4	19.2	10.1	11.5	6.4
	10.2–15.1	*11.4–25.8*	*13.0–27.4*	*6.7–15.0*	*7.6–17.0*	*3.4–11.7*
Tertiary education	11.8	15.4	13.1	13.8	6.3	11.5
	10.1–13.8	*11.3–20.6*	*9.5–17.8*	*10.6–17.7*	*4.4–8.8*	*7.7–16.8*
Household income						
Low	19.4	31.1	18.5	22.2	13.5	16.4
	17.0–22.1	*24.0–39.1*	*14.1–24.0*	*18.0–27.0*	*9.9–18.2*	*11.6–22.6*
Medium	12.6	14.7	17.5	11.2	9.2	11.3
	11.0–14.5	*10.9–19.4*	*12.5–23.8*	*8.6–14.6*	*6.6–12.6*	*7.8–16.2*
High	7.8	11.7	10.4	6.9	7.1	4.1
	5.8–10.6	*6.2–21.0*	*5.8–18.0*	*3.8–12.1*	*4.1–12.0*	*1.6–10.0*
Residential location						
Major city	14.4	17.2	16.1	16.0	9.4	14.0
	12.6–16.5	*12.9–22.6*	*12.2–20.9*	*12.7–20.1*	*6.8–12.8*	*10.0–19.4*
Inner regional	14.7	17.8	18.3	15.8	9.2	14.0
	11.9–18.0	*12.3–25.0*	*11.2–28.4*	*10.7–22.8*	*4.6–17.7*	*9.3–20.5*
Outer regional	11.5	20.4	12.6	10.9	9.8	7.7
	9.6–13.7	*14.1–28.6*	*9.1–17.2*	*7.4–15.7*	*6.8–14.0*	*4.9–11.9*
Remote/Very remote	21.0	26.6	34.8	14.9	14.8	15.0
	15.8–27.4	*15.9–41.0*	*20.1–53.1*	*8.4–24.9*	*8.5–24.5*	*5.8–33.6*
Reason for last dental visit						
Check-up	9.6	7.5	10.8	9.4	8.2	11.5
	8.5–10.8	*5.4–10.2*	*8.1–14.1*	*7.3–12.0*	*6.3–10.5*	*8.8–14.9*
Dental problem	31.5	64.0	36.8	30.4	17.6	17.2
	27.8–35.4	*53.9–73.0*	*29.6–44.7*	*24.3–37.4*	*12.7–23.8*	*11.7–24.6*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

5.1.3 Summary of findings

Table 5.5 presents an overview of aspects of the child's first dental visit. Information from Tables 5.1 to 5.4 has been combined to compare these aspects across population groups defined by age, sex, sociodemographic characteristics and reason for the last dental visit.

One in five children had visited a dental provider by the age of 2 years. The rate was very similar across other age groups. Around one in ten children of all ages had never visited a dental provider. The youngest age group accounted for the majority of this number with around one in three children aged 5–6 years having never visited a dental provider. The percentage that had never visited decreased sharply after the 5–6 years age group to around one in ten in children aged 7–8 years and significantly again to fewer than 2% among children aged 9–10 years. Some variation was seen between age groups for the reason for the child's first dental visit. Overall, most children first visited a dental provider for a check-up. Compared to the averages, the two youngest age groups had a slightly lower percentage of first visiting for a check-up, and thus a higher percentage of first visiting for a problem. The two oldest age groups are the opposite with the middle group, children aged 9–10 years, being around the average.

Indigenous children were less likely than non-Indigenous children to have first visited a dental provider at age 2 years or younger, but were no more likely than non-Indigenous children to have never visited a dental provider. There was a higher percentage of Indigenous children first visiting for a problem rather than for a check-up. In non-Indigenous children the rate was about 1 in 8 children who first visited for a problem, compared to 1 in 5 for Indigenous children.

An early first dental visit at age 2 years or younger was twice as likely for children whose parents had some tertiary education, compared to those with parents who had some vocational training or only school-level education. Conversely, children whose parents had only school-level education were almost twice as likely as children whose parents had some tertiary education to never have visited a dental provider, and children whose parents had some vocational training were between these two. Children whose parents had some vocational training or some tertiary education were more likely to have first visited for a check-up and less likely for a problem than children whose parents had only school-level education.

The household income groups showed a similar pattern to the parental education groups. A gradient pattern was more evident for having visited a dental provider by age 2 years or younger, first visiting for a check-up and first visiting for a problem. The difference in percentages of children who had never visited a dental provider between the high and low household income groups was not as pronounced as that between high and low education groups. The similar outcomes for Indigenous identity, parental education, and household income groups, point to an overall difference in the timing and nature of the first visit to a dental provider for the low and high socioeconomic groups.

Children who last visited a dental provider for a dental problem were less likely to have first visited a dental provider at age 2 years or younger than children who last visited for a check-up. They were also much more likely to have first visited a dental provider for a problem than a check-up.

In Tables 5.1 to 5.4, all four tables, sex of the child and parental country of birth was not associated with dental visiting.

Table 5.5: Summary of characteristics of a child's first dental visit

	First dental visit at age 2 years or younger	Never visited a dental provider	First visited a dental provider for a check-up	First visited a dental provider for a problem
Age				
5–6 years	Ref	Ref	Ref	Ref
7–8 years		↓↓		
9–10 years		↓↓	↑	↓
11–12 years		↓↓	↑	↓
13–14 years		↓↓	↑	↓
Sex				
Male	Ref	Ref	Ref	Ref
Female				
Indigenous identity				
Non-Indigenous	Ref	Ref	Ref	Ref
Indigenous	↓		↓	↑
Parent country of birth				
Australian born	Ref	Ref	Ref	Ref
Overseas born				
Parental education				
School	Ref	Ref	Ref	Ref
Vocational training		↓	↑	↓
Tertiary education	↑↑	↓↓	↑	↓
Household income				
Low	Ref	Ref	Ref	Ref
Medium	↑	↓	↑	↓
High	↑↑	↓	↑↑	↓↓
Residential location				
Major city	Ref	Ref	Ref	Ref
Inner regional				
Outer regional			↑	↓
Remote/Very remote	↓	↑	↓	↑
Reason for last dental visit[a]				
Check-up	Ref	Ref	Ref	Ref
Dental problem	↓		↓↓	↑↑

Ref=Reference group.
Symbols: ↓↓ Markedly lower; ↓ Lower; Not sig. different; ↑ Higher; ↑↑ Markedly higher.
[a]There is no summary data for reason for last dental in the second column, as this represents data for those who have never visited a dental provider.

5.2 Children's usual dental visits

Questions about usual behaviour reflect longer term behaviours and intentions. Aspects of usual visiting include the child's pattern of visiting a dental provider and the reasons for choosing the dental clinic the child usually visits.

5.2.1 Pattern of visiting

The pattern of dental visiting among children was associated with the likelihood of having dental care focussed on prevention, the benefit of early diagnosis and of prompt treatment of dental disease. It was also indicative of the likely receipt of regular professional advice on oral hygiene and home care.

Regular pattern

Regular dental visits contribute to the oral health status of adults and children (Luzzi and Spencer 2008). It is likely that the reason for most regular visits is a check-up rather than a dental problem, which favours preventive dental care.

Parents were asked 'How often does your child usually visit a dentist/dental therapist?' Response categories were 'Twice a year', 'Once a year', 'Once every 2 years', 'No regular pattern' and 'Other'. Table 5.6 combines the first three answer categories as those who visit a dentist/dental therapist regularly.

Two-thirds (67.1%) of all children visited a dental provider regularly. Children aged 7–8, 9–10, 11–12 and 13–14 years were significantly more likely to have visited a dental provider regularly than those aged 5–6 years (42.8%). In comparison to the 5–6 year age group, children aged 7–8 years were 1.5 times more likely to have seen a dental provider regularly, those aged 9–10 and 11–12 years were 1.8 times more likely and children aged 13–14 years old were 1.7 times more likely to have a regular dental visiting pattern.

A significantly higher percentage of children whose parents had some tertiary education (73.9%) or some vocational training (65.8%) were more likely to have regular dental visits than children whose parents had only school-level education (55.1%).

Very similar results were apparent in regards to household income. Children from households with high (78.4%) and medium (68.9%) income levels had a higher percentage visiting a dental provider regularly than those from households with low income (59.2%). The differences were significant. Children whose last dental visit was for a check-up (76.9%) had a significantly higher percentage of visiting a dental provider regularly than children whose last visit was for a dental problem (62.5%). There were no significant differences across groups by sex, Indigenous identity, parents' country of birth or residential location.

In summary, children in the older age groups, whose parents had a low education level, low household income, and where the child's last dental visit was for a dental problem, were significantly less likely to visit a dental provider regularly.

Table 5.6: Percentage of children who usually have a regular dental visiting pattern in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**67.1**	**42.8**	**66.1**	**75.0**	**77.3**	**74.4**
	64.6–69.4	*38.7–47.0*	*62.0–70.0*	*71.4–78.3*	*73.7–80.5*	*69.9–78.4*
Sex						
Male	67.1	41.7	65.4	76.5	79.0	72.8
	64.1–70.0	*36.3–47.4*	*59.6–70.7*	*72.0–80.4*	*74.4–82.8*	*66.0–78.7*
Female	67.0	43.8	66.9	73.3	75.8	76.1
	64.1–69.8	*38.6–49.1*	*61.6–71.8*	*68.5–77.6*	*70.3–80.5*	*70.2–81.1*
Indigenous identity						
Non-Indigenous	67.0	43.2	66.1	74.5	77.4	74.4
	64.6–69.4	*39.0–47.6*	*62.1–69.8*	*70.6–78.0*	*73.7–80.8*	*69.7–78.6*
Indigenous	67.4	36.4	66.1	80.9	75.4	73.5
	60.7–73.4	*24.8–49.8*	*51.1–78.4*	*72.4–87.2*	*64.7–83.7*	*58.7–84.4*
Parent country of birth						
Australian born	67.7	43.6	67.3	77.0	77.6	73.5
	64.9–70.3	*38.7–48.6*	*61.9–72.3*	*73.0–80.5*	*73.4–81.3*	*67.8–78.6*
Overseas born	66.2	41.5	64.3	72.3	76.8	75.5
	62.9–69.4	*35.6–47.7*	*58.3–69.9*	*67.0–77.0*	*71.6–81.4*	*68.9–81.1*
Parental education						
School	55.1	25.0	53.6	68.9	66.1	59.6
	50.9–59.2	*18.7–32.5*	*45.4–61.6*	*61.7–75.2*	*59.7–72.0*	*51.7–67.0*
Vocational training	65.8	40.5	64.0	74.5	73.9	78.0
	61.9–69.5	*32.7–48.9*	*55.4–71.7*	*66.7–80.9*	*66.3–80.2*	*67.4–85.8*
Tertiary education	73.9	51.6	73.6	78.3	84.4	83.1
	71.5–76.3	*46.4–56.7*	*68.8–78.0*	*74.1–82.1*	*79.9–88.1*	*78.2–87.0*
Household income						
Low	59.2	30.3	61.0	68.7	67.5	66.0
	55.6–62.7	*24.5–36.8*	*54.4–67.2*	*62.8–74.0*	*61.7–72.8*	*56.0–74.8*
Medium	68.9	45.9	65.8	75.6	81.4	78.2
	65.8–71.8	*40.4–51.6*	*59.7–71.5*	*69.8–80.5*	*76.1–85.8*	*72.5–83.1*
High	78.4	57.9	76.0	88.4	86.1	83.6
	74.6–81.7	*49.0–66.3*	*67.3–83.0*	*83.3–92.1*	*79.7–90.7*	*74.6–89.8*
Residential location						
Major city	68.5	43.5	69.5	75.2	78.6	77.2
	64.8–72.0	*37.2–49.9*	*63.9–74.6*	*69.8–79.9*	*73.3–83.1*	*70.8–82.5*
Inner regional	64.2	40.7	70.9	70.2	71.8	68.7
	58.8–69.2	*32.4–49.6*	*60.2–79.7*	*61.4–77.8*	*64.6–78.0*	*57.5–78.0*
Outer regional	68.3	44.3	61.8	76.6	78.0	76.2
	65.0–71.4	*37.0–51.8*	*53.0–69.8*	*70.9–81.4*	*73.5–81.8*	*69.7–81.8*
Remote/Very remote	62.9	41.8	49.8	78.1	84.1	65.1
	56.7–68.6	*32.4–51.8*	*42.6–57.0*	*68.1–85.6*	*71.3–91.8*	*50.3–77.4*
Reason for last dental visit						
Check-up	76.9	68.1	74.4	79.1	81.8	78.4
	74.7–79.0	*63.3–72.5*	*69.7–78.6*	*75.3–82.4*	*78.3–84.9*	*73.0–83.0*
Dental problem	62.5	44.6	64.9	68.1	70.0	57.5
	58.5–66.4	*35.3–54.3*	*57.2–71.9*	*61.6–73.9*	*62.5–76.6*	*47.7–66.8*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Irregular pattern

Irregular dental visits decrease the likelihood of the child receiving preventive oral care. Table 5.7 explores the attributes of children who visit a dental provider irregularly and uses data from the question described for Table 5.6, focusing on the answer category 'No regular pattern'.

Nearly one in four (23.4%) children visited a dental provider irregularly. While Table 5.6 showed that the proportion of children who visited regularly increases across age groups, the proportion of children visiting irregularly does not decrease in response, and stays relatively stable between age groups.

There were significant differences by parental education. Among children whose parents education was school-level (31.7%), irregular dental visits were almost 1.4 times more prevalent than among children whose parents had some vocational training (23.4%) and 1.7 times higher than children whose parents had some tertiary education (18.9%).

Children from families with a low household income (28.8%) were significantly more likely to see a dental provider irregularly than children from families with medium (21.9%) and high (16.2%) household income.

More children who had last visited for a dental problem (35.6%) than those last visiting for a check-up (22.8%) visited a dental provider irregularly. This difference was statistically significant. No statistically significant differences were found among groups of children by sex, Indigenous identity, parents' country of birth or residential location.

In summary, the results support the findings of Table 5.6 for children who visit regularly. Children whose parents had a low level of education, low household income and where the reason for the last dental visit was a dental problem were more likely to visit a dental provider irregularly.

Table 5.7: Percentage of children who usually have an irregular dental visiting pattern in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**23.4**	**24.2**	**25.0**	**23.0**	**19.7**	**24.9**
	21.7–25.1	*21.2–27.6*	*21.8–28.5*	*19.9–26.4*	*16.9–22.8*	*20.9–29.3*
Sex						
Male	23.6	25.0	26.1	21.8	18.3	26.5
	21.3–26.1	*20.3–30.4*	*21.7–30.9*	*17.9–26.2*	*14.8–22.4*	*20.8–33.3*
Female	23.1	23.4	23.8	24.5	21.0	23.1
	21.1–25.2	*19.6–27.8*	*19.7–28.5*	*20.4–29.1*	*16.8–25.8*	*18.3–28.6*
Indigenous identity						
Non-Indigenous	23.4	24.0	25.2	23.6	19.6	24.8
	21.7–25.2	*21.0–27.4*	*22.0–28.8*	*20.3–27.3*	*16.7–23.0*	*20.7–29.4*
Indigenous	22.3	26.6	22.7	17.1	20.5	26.2
	18.4–26.7	*16.5–40.0*	*14.9–33.0*	*11.0–25.6*	*14.1–28.7*	*15.4–40.8*
Parent country of birth						
Australian born	23.0	22.4	26.0	21.1	19.9	25.8
	21.2–25.0	*18.8–26.6*	*21.8–30.6*	*18.0–24.6*	*16.7–23.6*	*20.8–31.6*
Overseas born	23.8	26.9	23.6	25.6	19.4	23.5
	21.4–26.5	*22.3–32.1*	*18.7–29.4*	*20.9–30.9*	*15.2–24.4*	*18.1–29.9*
Parental education						
School	31.7	32.0	30.0	26.8	29.7	38.3
	28.6–35.0	*24.9–39.9*	*24.0–36.9*	*20.9–33.7*	*24.3–35.8*	*31.2–45.9*
Vocational training	23.4	19.8	28.4	24.1	23.0	21.9
	20.4–26.7	*14.2–26.9*	*21.5–36.6*	*17.7–32.0*	*17.3–30.0*	*14.1–32.4*
Tertiary education	18.9	22.1	21.1	20.9	13.7	16.7
	17.0–21.0	*18.3–26.5*	*16.9–25.9*	*17.4–24.9*	*10.4–17.7*	*12.8–21.6*
Household income						
Low	28.8	28.0	28.1	28.0	26.5	33.3
	25.9–31.9	*21.9–34.9*	*22.6–34.4*	*22.8–33.8*	*21.9–31.7*	*24.6–43.2*
Medium	21.9	22.1	25.6	23.5	17.4	21.0
	19.7–24.3	*18.4–26.3*	*21.0–30.7*	*18.7–29.1*	*13.1–22.6*	*16.4–26.5*
High	16.2	21.2	19.7	10.6	13.0	16.2
	13.4–19.5	*15.2–28.8*	*13.3–28.1*	*7.1–15.6*	*8.8–18.9*	*10.1–25.2*
Residential location						
Major city	21.9	24.0	22.5	23.3	17.5	21.8
	19.4–24.5	*19.5–29.2*	*18.0–27.6*	*18.7–28.7*	*13.6–22.3*	*16.7–28.0*
Inner regional	26.2	25.1	22.9	26.0	25.3	30.9
	22.4–30.5	*20.0–31.0*	*16.3–31.1*	*19.6–33.6*	*19.9–31.6*	*21.4–42.3*
Outer regional	23.3	23.7	29.0	21.6	19.7	23.1
	20.7–26.1	*18.9–29.3*	*22.3–36.8*	*16.9–27.2*	*16.2–23.8*	*17.8–29.5*
Remote/Very remote	25.2	24.4	33.9	19.9	15.5	34.8
	20.1–31.2	*15.9–35.6*	*25.8–43.0*	*13.4–28.4*	*8.1–27.5*	*22.5–49.6*
Reason for last dental visit						
Check-up	22.8	31.2	25.3	20.8	18.0	21.4
	20.8–24.9	*26.9–35.8*	*21.2–29.9*	*17.4–24.5*	*15.0–21.5*	*16.8–26.7*
Dental problem	35.6	51.5	32.8	31.1	28.2	40.8
	31.8–39.5	*42.4–60.5*	*26.2–40.2*	*25.4–37.4*	*21.9–35.5*	*31.8–50.6*

Row 1: Per cent of children;
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

5.2.2 Reason for choosing usual dental clinic

The reasons for parents choosing the dental clinic at which their child usually receives care provide insight into the main drivers behind the preference for one clinic over another.

Location

Parents were asked 'Why did you choose the dental clinic your child usually visits for general dental care for his/her oral health?' A number of response options were provided; 'Convenient location', 'Convenient hours', 'Prompt attention', 'Emphasis on prevention', 'Quality of dental care', Personal recommendation', Special skills of dentist/clinic', 'Cost', 'Attitude of staff', 'Covered by private health', and 'Other'. Parents could indicate as many reasons as were relevant. The most frequently reported reason was the convenient location of the dental clinic (Table 5.8).

Over half (54.0%) of parents reported the location of dental clinic as a reason for choosing it as their child's usual place to receive dental care. Across age groups, the frequency was higher among the older than the younger age groups, but the differences were small and non-significant.

The highest frequency among population groups was for Indigenous children, with 61.9% of children's parents citing the clinic location as a factor in their choice. The lowest frequency was among those children living in outer regional areas (48.1%).

Among children of all ages there was little variation across most population groups. The largest variations were seen across groups by residential location and household income. The difference between children living in major city areas (58.0%) and those in outer regional areas (48.1%) was the only significant result, with a difference of 9.9%.

There were two significant results in the data across population and age groups, and these coincided with the largest differences. The biggest difference was between Indigenous and non-Indigenous groups, with the frequency of responses indicating location as a reason for the choice of dental clinic (72.0%) higher than non-Indigenous (48.8%) among children aged 5–6 years. Across age groups, parents of Indigenous children had a consistently higher frequency of citing location than parents of non-Indigenous children. The other significant difference was between children aged 13–14 years in outer regional areas (44.9%) and those in major cities (63.8%) with a statistically significant difference of 18.9 percentage points. A difference of over 10 percentage points was evident among ages 9–10 years and 13–14 years between low and high income households. Parents of children from high income households, compared to medium and low income households, had a consistently lower frequency of citing clinic location as a factor in the clinic choice across all age groups.

In summary, there was no overall pattern to differences in the frequency of reporting convenient location as a reason for choosing the dental clinic their child usually visited for dental care. There may be some association with Indigenous identity and household income, but this was not statistically significant. The findings suggested that the convenience of location of the clinic was a relatively universal factor in dental clinic choice.

Table 5.8: Percentage of children whose parents indicated that location was a factor in the choice of their child's dental clinic in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**54.0**	**50.3**	**50.2**	**57.3**	**55.6**	**55.0**
	51.9–56.1	*45.6–54.9*	*46.4–54.0*	*53.6–60.8*	*51.7–59.5*	*50.9–59.1*
Sex						
Male	53.4	51.4	52.6	53.2	58.4	51.2
	50.5–56.3	*45.6–57.1*	*46.5–58.7*	*48.5–57.8*	*53.5–63.1*	*44.8–57.5*
Female	54.6	49.2	47.4	62.3	53.1	59.1
	52.0–57.2	*43.1–55.4*	*42.4–52.5*	*56.5–67.8*	*47.8–58.4*	*53.8–64.3*
Indigenous identity						
Non-Indigenous	53.4	48.8	49.4	57.0	55.1	54.8
	51.3–55.4	*44.1–53.5*	*45.5–53.2*	*53.0–60.8*	*51.0–59.1*	*50.4–59.1*
Indigenous	61.9	72.0	59.2	60.4	62.4	59.1
	52.2–70.7	*56.6–83.6*	*44.1–72.8*	*47.7–71.9*	*48.9–74.3*	*41.0–75.0*
Parent country of birth						
Australian born	53.8	47.8	50.7	57.8	56.7	54.2
	51.1–56.5	*41.9–53.7*	*45.7–55.6*	*53.2–62.3*	*51.9–61.4*	*48.8–59.5*
Overseas born	54.2	54.0	49.4	56.5	54.0	56.2
	51.3–57.1	*46.6–61.3*	*43.1–55.7*	*50.8–62.0*	*47.8–60.1*	*50.4–61.8*
Parental education						
School	54.4	55.8	53.0	61.0	52.3	51.7
	50.4–58.4	*45.8–65.4*	*45.1–60.7*	*53.8–67.8*	*45.7–58.7*	*43.5–59.9*
Vocational training	54.3	45.6	45.7	61.1	58.1	57.2
	50.2–58.4	*36.4–55.2*	*36.2–55.6*	*53.4–68.3*	*48.1–67.4*	*48.4–65.5*
Tertiary education	53.6	50.2	50.2	54.1	56.4	56.3
	51.1–56.2	*44.2–56.3*	*44.6–55.7*	*49.5–58.7*	*51.4–61.3*	*50.3–62.1*
Household income						
Low	56.5	50.8	50.8	60.6	55.2	61.0
	53.0–60.0	*42.9–58.6*	*44.3–57.2*	*53.7–67.2*	*48.3–61.8*	*53.9–67.6*
Medium	54.7	50.8	51.5	58.1	59.0	52.9
	52.1–57.3	*44.7–57.0*	*45.7–57.2*	*53.4–62.7*	*53.8–64.0*	*46.8–59.0*
High	49.2	46.7	47.3	50.4	51.6	49.4
	44.8–53.6	*36.8–56.9*	*39.0–55.7*	*43.3–57.5*	*43.6–59.5*	*40.2–58.6*
Residential location						
Major city	58.0	51.0	53.9	61.7	57.3	63.8
	55.3–60.7	*44.5–57.5*	*47.8–59.9*	*57.4–65.8*	*51.8–62.5*	*57.5–69.7*
Inner regional	50.9	50.5	46.1	55.3	57.7	45.7
	45.6–56.2	*39.5–61.4*	*39.0–53.5*	*45.4–64.8*	*45.2–69.4*	*36.5–55.3*
Outer regional	48.1	48.7	45.4	49.4	52.5	44.9
	43.4–52.9	*39.1–58.4*	*39.7–51.2*	*41.1–57.7*	*45.9–58.9*	*38.7–51.2*
Remote/Very remote	52.7	49.2	50.2	54.7	49.4	61.1
	42.2–62.9	*33.8–64.7*	*37.3–63.2*	*41.9–67.0*	*36.0–62.9*	*46.4–74.1*
Reason for last dental visit						
Check-up	54.0	49.1	49.9	59.9	54.4	55.0
	51.7–56.3	*43.7–54.5*	*45.2–54.6*	*55.9–63.7*	*50.3–58.4*	*50.3–59.7*
Dental problem	53.8	54.8	51.1	49.4	60.2	55.1
	49.7–57.9	*46.7–62.7*	*43.6–58.5*	*41.4–57.4*	*52.1–67.9*	*44.5–65.3*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.
Note: the data in this table is from a question which accepted multiple responses.

Cost

The second most frequently reported reason for choosing the dental clinic usually visited for the child's dental care was the cost of dental care, and the percentages for this response are shown in Table 5.9.

Almost one-third of parents (30.1%) cited cost as a reason for choosing their child's dental care clinic. The percentage increased across age groups, from 22.4% among 5–6 year olds, increasing to 33.6% among 13–14 year olds. The biggest increases across age groups were between the younger age groups, with an increase of 4.9 percentage points between children aged 5–6 years and 7–8 years, and of 5.0% between children aged 7–8 years and those aged 9–10 years, whereas the differences between the older groups were small. The differences between the youngest age group and children aged 9–10, 11–12 and 13–14 years were statistically significant.

For children of all ages, the population group with the highest percentage of responses reporting cost as a reason for choosing their child's dental clinic was the low household income group (40.6%). The high household income group had the lowest percentage (16.6%).

Among the different population groups, significant differences were seen between responses by parental education and household income groups and the reason for the child's last dental visit. Responses from parents with some tertiary education cited cost as a reason for choosing the dental clinic (26.9%) less than parents with only school-level education (33.0%) or some vocational training (34.3%). The difference was statistically significant between parents with some tertiary education and those with some vocational training. The differences between all three household income groups were statistically significant. Responses from parents from low income households had the highest percentage reporting cost as a reason (40.6%) followed by the medium household income group (29.5%) and the high household income group (16.6%). Parents who reported last taking their child to a dental provider for a dental problem were significantly more likely to cite cost as a factor in dental clinic choice (39.1%) than those who last visited for a check-up (27.6%).

The largest differences were seen among household income groups and reason for last dental visit. Among household income groups, parents of children aged 11–12 years displayed the biggest and most statistically significant differences. The differences between all household income groups were also statistically significant among the 5–6 years age group, while all other age groups had a significant difference between low and high household income groups only. For the reason for the last dental visit, the biggest difference was among children aged 13–14 years with a statistically significant difference of 19.5 percentage points. The differences were also significant between those who last visited for a check-up compared with those who last visited for a problem among all age groups except those aged 7–8 years.

In summary, cost tended to be cited more frequently among parents of older children. The socioeconomic indicators of parental education and household income were also associated with cost as a reason for choice, with those from higher socioeconomic backgrounds citing cost as a reason for dental clinic choice less frequently. Parents of children who last visited for a problem were also more likely to cite cost as a reason for their clinic choice, compared to those who last visited for a check-up.

Table 5.9: Percentage of children whose parents indicated that cost was a factor in the choice of their child's dental clinic in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**30.1**	**22.4**	**27.3**	**32.3**	**32.3**	**33.6**
	28.1–32.2	*18.8–26.5*	*23.8–31.1*	*29.0–35.7*	*28.9–35.8*	*29.1–38.4*
Sex						
Male	29.2	21.8	25.2	33.1	33.5	29.9
	26.8–31.8	*17.1–27.4*	*20.7–30.3*	*28.6–37.8*	*28.9–38.5*	*24.4–36.1*
Female	31.0	23.0	29.7	31.3	31.1	37.5
	28.5–33.6	*17.9–29.1*	*24.7–35.2*	*26.7–36.2*	*26.7–35.8*	*31.5–43.9*
Indigenous identity						
Non-Indigenous	30.1	21.8	26.8	32.9	32.2	33.8
	28.0–32.2	*18.1–26.0*	*23.0–31.1*	*29.7–36.3*	*29.0–35.6*	*29.2–38.7*
Indigenous	30.2	31.1	32.2	25.7	33.3	30.2
	22.2–39.6	*15.3–53.1*	*20.0–47.5*	*14.4–41.4*	*21.3–47.9*	*18.3–45.5*
Parent country of birth						
Australian born	30.7	22.2	29.3	32.9	34.4	32.4
	28.2–33.3	*17.3–28.0*	*24.5–34.5*	*29.0–37.1*	*30.0–39.1*	*26.4–39.1*
Overseas born	29.2	22.8	24.2	31.3	29.2	35.2
	26.4–32.1	*18.2–28.1*	*19.3–29.8*	*26.6–36.6*	*24.8–34.1*	*28.0–43.1*
Parental education						
School	33.0	31.8	26.5	32.8	33.2	38.2
	29.5–36.8	*24.1–40.6*	*19.7–34.6*	*26.8–39.4*	*27.3–39.8*	*31.0–45.9*
Vocational training	34.3	29.4	32.9	37.3	29.2	40.1
	30.2–38.7	*21.0–39.4*	*24.2–43.0*	*30.2–45.0*	*22.2–37.3*	*30.7–50.3*
Tertiary education	26.9	17.2	26.2	29.4	32.6	27.1
	24.3–29.8	*13.6–21.6*	*21.5–31.4*	*24.7–34.5*	*28.0–37.5*	*21.1–34.0*
Household income						
Low	40.6	32.3	35.4	44.5	42.7	43.3
	37.4–43.9	*24.6–41.0*	*28.7–42.7*	*38.0–51.2*	*37.7–47.9*	*35.7–51.3*
Medium	29.5	21.5	27.9	28.6	34.3	33.3
	27.0–32.1	*16.6–27.4*	*22.9–33.6*	*24.3–33.3*	*28.9–40.1*	*27.3–39.8*
High	16.6	8.9	18.4	18.1	15.2	20.7
	13.5–20.3	*5.1–15.2*	*12.4–26.4*	*12.8–25.0*	*11.0–20.5*	*12.8–31.7*
Residential location						
Major city	28.3	20.6	26.4	31.4	28.8	32.0
	25.7–31.1	*16.0–26.2*	*21.4–32.0*	*26.7–36.4*	*24.3–33.8*	*25.9–38.8*
Inner regional	33.3	27.6	22.1	33.6	40.9	38.6
	28.8–38.2	*19.5–37.6*	*14.2–32.8*	*27.2–40.7*	*34.0–48.2*	*26.5–52.4*
Outer regional	31.4	23.1	32.0	32.2	34.9	31.6
	28.0–35.1	*17.0–30.5*	*25.9–38.8*	*26.8–38.1*	*29.1–41.3*	*24.8–39.3*
Remote/Very remote	30.8	20.8	32.3	36.9	28.6	34.3
	22.1–41.2	*11.0–36.0*	*20.2–47.5*	*23.2–53.0*	*18.2–42.0*	*24.7–45.4*
Reason for last dental visit						
Check-up	27.6	18.9	27.4	29.3	29.7	30.0
	25.4–29.9	*15.4–23.1*	*23.2–32.1*	*25.8–33.1*	*26.3–33.3*	*24.8–35.8*
Dental problem	39.1	36.0	26.9	41.1	42.0	49.5
	35.6–42.7	*26.0–47.3*	*20.6–34.5*	*34.5–48.0*	*34.3–50.1*	*40.9–58.2*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.
Note: the data in this table is from a question which accepted multiple responses.

Quality of care

The third most frequently reported reason for choosing the dental clinic usually visited for the child's dental care was the quality of the dental care provided, as reported in Table 5.10.

Slightly over one-quarter (28.8%) of responses cited quality of dental care as a reason for choosing the dental clinic their child usually visited for dental care. There was little variation and no pattern across age groups. The group with the highest percentage was children aged 7–8 years (31.4%), while those aged 9–10 years had the lowest (26.6%).

Among children of all ages, the population group with the highest percentage of responses indicating quality of care as a reason for selecting their child's usual dental clinic was the high household income group (34.2%). Parents of Indigenous children had the lowest frequency citing quality of care as a reason they chose the dental clinic for their child (19.0%).

Across population groups among children of all ages, some statistically significant differences were evident. Parents of non-Indigenous children were significantly more likely to report quality of care as a factor in choosing their child's usual dental clinic (29.6%) compared to parents of Indigenous children (19.0%). Significant differences were also seen between parental education groups. A significantly higher percentage of parents with some tertiary education reported quality of care as a reason (33.4%) than parents with either some vocational training (25.4%) or only school-level education (23.2%). The low household income group had a significantly lower percentage (22.7%) than medium (30.1%) and high (34.2%) household income groups of parents citing quality of care as a reason for choosing the dental clinic at which their child usually receives care. Significant differences were not evident among groups by sex, parents' country of birth, residential location or reason for the last dental visit.

The largest difference was seen among children aged 11–12 years between low and high household income groups (17.7 percentage points). This difference was statistically significant, as was the difference between low and medium household income groups (10.0 percentage points) in that age group, and low and high household income groups among the 7–8 years age group (14.5% point difference). The second largest difference (15.5 percentage points) was among children aged 13–14 years between Indigenous (12.7%) and non-Indigenous (28.2%) children. This was not significant, but the difference of 15.0 percentage points among ages 11–12 years between groups by Indigenous identity was significant.

In summary, the socioeconomic aspects of parental education, household income, and Indigenous identity was associated with quality of care being reported as a reason for parents choosing the usual dental clinic for their child's dental care.

Table 5.10: Percentage of children whose parents indicated that quality of care was a factor in the choice of their child's dental clinic in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**28.8**	**29.3**	**31.4**	**26.6**	**29.9**	**27.2**
	26.9–30.8	*25.1–34.0*	*28.1–35.0*	*23.3–30.3*	*26.6–33.5*	*23.2–31.6*
Sex						
Male	28.7	29.5	32.6	24.2	29.1	28.8
	26.1–31.3	*24.2–35.5*	*28.1–37.4*	*20.2–28.9*	*24.7–33.9*	*21.8–36.9*
Female	29.0	29.1	30.1	29.6	30.7	25.5
	26.6–31.5	*23.4–35.6*	*24.9–35.9*	*25.2–34.5*	*26.4–35.4*	*21.4–30.1*
Indigenous identity						
Non-Indigenous	29.6	29.3	32.4	27.3	30.9	28.2
	27.7–31.5	*25.1–34.0*	*28.9–36.1*	*23.8–31.1*	*27.6–34.5*	*24.0–32.8*
Indigenous	19.0	29.1	20.8	19.5	15.9	12.7
	13.1–26.8	*13.0–52.9*	*11.2–35.4*	*11.2–31.6*	*9.1–26.2*	*5.1–28.4*
Parent country of birth						
Australian born	28.5	27.9	29.3	25.9	30.0	29.4
	26.3–30.8	*23.0–33.3*	*25.1–33.9*	*21.8–30.4*	*25.8–34.7*	*23.9–35.6*
Overseas born	29.2	31.5	34.7	27.8	29.8	24.2
	26.3–32.2	*24.7–39.3*	*29.4–40.5*	*22.7–33.5*	*24.8–35.3*	*18.7–30.7*
Parental education						
School	23.2	23.3	25.3	20.3	21.1	25.3
	20.2–26.4	*15.6–33.3*	*19.3–32.4*	*14.7–27.2*	*16.2–27.0*	*19.7–31.9*
Vocational training	25.4	20.7	23.0	24.0	30.6	27.8
	22.2–28.9	*13.8–29.8*	*16.7–30.9*	*17.7–31.7*	*23.4–38.9*	*18.7–39.1*
Tertiary education	33.4	35.1	37.9	30.4	34.0	29.9
	30.9–36.0	*29.3–41.5*	*32.5–43.7*	*26.0–35.3*	*29.9–38.3*	*24.0–36.6*
Household income						
Low	22.7	24.5	23.5	21.6	21.2	23.4
	20.1–25.6	*17.4–33.3*	*18.4–29.5*	*17.0–27.1*	*16.7–26.6*	*18.3–29.3*
Medium	30.1	30.1	33.0	28.6	31.2	27.8
	27.6–32.6	*24.6–36.2*	*27.5–39.0*	*23.3–34.6*	*27.1–35.6*	*21.9–34.5*
High	34.2	31.7	38.0	31.3	38.9	30.2
	30.5–38.2	*23.5–41.3*	*30.9–45.6*	*24.5–39.0*	*31.7–46.7*	*21.8–40.1*
Residential location						
Major city	29.1	33.2	31.5	26.3	30.7	25.0
	26.4–31.9	*26.8–40.2*	*26.2–37.3*	*21.8–31.3*	*25.9–36.1*	*19.9–30.9*
Inner regional	27.1	26.0	31.9	22.7	27.0	27.5
	22.8–31.9	*16.6–38.2*	*26.1–38.4*	*15.6–31.8*	*20.5–34.7*	*19.6–37.2*
Outer regional	30.3	24.0	29.3	31.2	30.9	33.2
	27.1–33.7	*16.9–32.9*	*23.6–35.8*	*24.6–38.7*	*24.4–38.1*	*25.4–42.1*
Remote/Very remote	28.6	25.2	39.7	23.5	32.6	20.6
	22.7–35.4	*17.4–35.1*	*30.0–50.3*	*15.5–34.1*	*23.7–42.9*	*12.3–32.4*
Reason for last dental visit						
Check-up	29.6	29.7	31.2	26.1	31.5	29.4
	27.5–31.7	*25.1–34.9*	*27.4–35.3*	*22.7–30.0*	*27.9–35.3*	*24.6–34.8*
Dental problem	26.1	27.7	32.2	28.2	24.1	17.3
	22.8–29.6	*19.3–38.0*	*25.0–40.2*	*22.5–34.6*	*18.2–31.0*	*11.3–25.6*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.
Note: the data in this table is from a question which accepted multiple responses.

Emphasis on prevention

Ideally, preventive dental care is preferable to the treatment or restoration of dental problems. One of the reasons parents chose the dental clinic their child usually visited for dental care was an emphasis on prevention at the clinic (Table 5.11).

Among children of all ages, 12.7% of responses indicated an emphasis on prevention as a reason for choosing the dental clinic their child usually visited for care. There was no pattern and little variation across age groups. Parents of children aged 11–12 years most frequently cited an emphasis on prevention as a reason for their choice (14.0%) and parents of children aged 9–10 years the least (10.9%).

Among population groups, children from high income households had the highest frequency of responses indicating an emphasis on prevention as reason for choice of dental clinic (14.3%) and children who last visited the dental provider for a dental problem the lowest (9.7%).

There was little variation across different population groups and no statistically significant differences. The biggest difference (3.8 percentage points) was seen between children who last visited for a dental problem (9.7%) and those who last visited for a check-up (13.5%). A similar magnitude difference of 3.1 percentage points was seen between children from households of low income (11.2%) and those of high income (14.3%). There was an upward trend evident across the population groups by household income. For example, among children aged 11–12 years the frequency of parents reporting an emphasis on prevention as a reason for choosing their child's usual dental clinic rose from 10.8% among the low household income group, to 14.3% among medium income households, to 18.8% among high income households. There were also non-significant differences between children of parents born overseas and those born in Australia (e.g. among children aged 13–14 years, 10.8% for children of parents born overseas, compared to 16.2% for children of parents born in Australia) and children who last visited for a dental problem compared with those who last visited for a check-up (e.g. among ages 11–12 years, 9.0% for children who last visited for a dental problem and 15.3% for those who last visited for a check-up).

Overall, the largest difference was seen among children aged 5–6 years between parental education groups, with 15.0% of parents with some tertiary education reporting an emphasis on prevention as a reason for choosing the dental clinic, compared to only 5.0% of parents with some vocational training. This was a statistically significant difference of 10.0 percentage points. Another statistically significant result was also across parental education groups. Among children aged 9–10 years, there was a significant difference of 9.0 percentage points between children of parents with only school-level education (4.7%) and those with some tertiary education (13.7%). A significant difference of 9.9 percentage points was seen among children aged 7–8 years between parents of Indigenous children (3.5%) and parents of non-Indigenous children (13.7%).

In summary, there was no consistent pattern in the data. An emphasis on prevention was an infrequently cited reason for choosing the dental clinic a child usually visited for care. The majority of differences by age of child and population group were small and non-significant.

Table 5.11: Percentage of children whose parents indicated that an emphasis on prevention was a factor in the choice of their child's dental clinic in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**12.7**	**11.7**	**12.6**	**10.9**	**14.0**	**13.9**
	11.3–14.1	*9.4–14.6*	*10.4–15.1*	*8.9–13.2*	*11.5–16.8*	*10.2–18.6*
Sex						
Male	12.5	13.8	11.2	10.4	14.0	13.8
	10.8–14.5	*10.3–18.3*	*8.5–14.6*	*7.9–13.6*	*10.8–17.9*	*8.7–21.0*
Female	12.8	9.8	14.2	11.4	13.9	14.0
	11.3–14.5	*6.7–14.0*	*10.8–18.5*	*8.7–14.8*	*11.0–17.6*	*10.8–18.0*
Indigenous identity						
Non-Indigenous	12.8	11.8	13.4	10.6	13.9	14.1
	11.4–14.3	*9.3–14.9*	*11.1–16.1*	*8.6–12.9*	*11.4–16.8*	*10.3–19.0*
Indigenous	10.8	10.5	3.5	13.6	15.2	11.2
	6.8–16.8	*3.9–25.2*	*1.2–9.8*	*6.3–26.9*	*7.1–29.9*	*4.1–26.8*
Parent country of birth						
Australian born	13.7	12.2	12.9	11.4	15.3	16.2
	11.8–15.8	*8.8–16.7*	*10.0–16.4*	*9.0–14.5*	*12.0–19.5*	*10.8–23.6*
Overseas born	11.2	11.0	12.2	10.0	12.0	10.8
	9.6–13.0	*7.4–16.0*	*9.0–16.4*	*7.1–14.0*	*9.2–15.4*	*7.4–15.5*
Parental education						
School	11.0	9.5	9.9	4.7	11.9	16.4
	8.6–14.0	*5.1–17.0*	*6.1–15.7*	*2.5–8.7*	*8.2–16.9*	*10.6–24.5*
Vocational training	11.9	5.0	11.3	10.3	16.6	14.7
	9.6–14.5	*2.3–10.5*	*7.2–17.1*	*6.3–16.5*	*10.8–24.6*	*9.4–22.3*
Tertiary education	13.9	15.0	14.8	13.7	13.7	12.6
	12.2–15.9	*11.2–19.7*	*11.5–18.9*	*10.7–17.4*	*10.7–17.4*	*8.2–18.9*
Household income						
Low	11.2	11.0	9.9	10.9	10.8	12.9
	9.0–13.8	*6.5–18.0*	*6.5–14.9*	*7.2–16.1*	*7.1–16.0*	*8.9–18.3*
Medium	13.2	11.5	13.9	11.0	14.3	14.9
	11.4–15.2	*8.2–16.0*	*10.3–18.5*	*8.5–14.3*	*10.9–18.5*	*9.9–21.8*
High	14.3	12.9	15.8	10.7	18.8	12.4
	11.7–17.2	*7.7–20.8*	*11.2–21.8*	*6.7–16.6*	*13.5–25.5*	*6.9–21.3*
Residential location						
Major city	12.3	15.4	11.2	10.9	13.1	11.7
	10.7–14.1	*11.6–20.1*	*8.5–14.7*	*8.1–14.6*	*10.0–16.8*	*8.1–16.5*
Inner regional	12.4	8.8	13.8	6.7	16.6	14.2
	9.9–15.3	*5.0–15.1*	*8.4–21.8*	*3.5–12.4*	*10.7–24.7*	*9.2–21.2*
Outer regional	14.0	7.3	13.9	14.0	14.5	17.5
	11.0–17.8	*4.1–12.7*	*9.4–20.0*	*10.2–18.9*	*10.3–20.0*	*8.8–31.8*
Remote/Very remote	12.2	7.1	15.9	10.6	14.2	12.7
	8.4–17.3	*3.0–16.1*	*9.3–25.7*	*5.3–20.0*	*7.4–25.5*	*5.5–26.7*
Reason for last dental visit						
Check-up	13.5	12.7	13.3	12.1	15.3	13.8
	12.0–15.2	*9.9–16.2*	*10.7–16.3*	*9.7–14.9*	*12.4–18.7*	*10.2–18.5*
Dental problem	9.7	8.0	10.6	7.2	9.0	14.1
	7.5–12.4	*4.1–15.0*	*7.1–15.5*	*4.5–11.1*	*5.4–14.5*	*7.9–23.9*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.
Note: the data in this table is from a question which accepted multiple responses.

Summary of findings

Table 5.12 presents a summary of Tables 5.5 to 5.11, giving an overview of characteristics of the child's usual dental visits. The table shows a comparison by population groups defined by age, sex, sociodemographic characteristics and reason for last dental visit.

Using ages 5–6 years as a reference group, all other age groups had a markedly higher percentage of children with a regular dental visiting pattern. Less than half of children aged 5–6 years had a regular pattern. The proportion was two-thirds for ages 7–8 years. By ages 9–10 years, three-quarters of children had a regular dental visiting pattern and this level persisted in the two oldest age groups. It is interesting to note that the percentage of children with an irregular dental visiting pattern was relatively stable across all age groups. Not reported is the percentage of children who have neither a regular nor irregular pattern of attendance. These children were primarily those who had not yet established a pattern of attendance, and were accordingly most prevalent in the youngest age group.

Among the reasons for choosing the dental clinic for the child's dental care, very little difference was evident across age groups for quality of care and an emphasis on prevention. Location became a slightly more important reason for choosing a clinic across older age groups, while the reason of cost became much more important.

Among the groups defined by sociodemographic characteristics, there were some marked differences and visible patterns in the data, the most marked between the household income groups. Five out of the six tables showed a consistent pattern across groups from low to high household income. Using households with low income as the reference, medium income households had a higher percentage of children who visited the dental provider regularly and high income households had a much higher percentage. The reverse was true for children who visited the dental provider irregularly. Of the reasons for choosing the child's usual dental clinic, high income households were markedly less likely to report cost and location as reasons and markedly more likely to report quality of care, with the reporting for medium income households lying between the low and high groups.

The same pattern in the data was evident between groups defined by levels of parental education for regular and irregular dental visiting patterns and for choosing the child's usual dental clinic because of the quality of care provided. One in five Indigenous children attended a dental clinic chosen for the quality of care it provides compared to a higher rate of one in three among non-Indigenous children. There was a markedly higher prevalence of an irregular pattern of visiting among children who last visited for a dental problem than those who last visited for a check-up.

The data on choosing the child's usual dental clinic because of quality of care showed a variation between the indicators of low and high socioeconomic status. The high socioeconomic group for parental education and household income were more likely to have given this aspect of dental care consideration, while the more logistical and practical considerations of location and cost tended to be universally relevant, except across household income groups where there was an evident gradient.

The responses of parents whose child last visited a dental provider for a dental problem showed a markedly higher prevalence of attending a clinic chosen for cost reasons than the responses of parents whose child last visited for a check-up. Across residential location groups there was small variation in the prevalence of dental visiting patterns and the reasons for choosing the child's usual clinic, but there was no consistent pattern in differences with the level of

remoteness. There was little to no variation in a child's usual dental visits based on population groups by sex of the child and parents' country of birth.

Table 5.12: Summary of characteristics of child's usual dental visits

	Regularly visit dentist	Irregularly visit dentist	Chose dental clinic for location	Chose dental clinic for cost	Chose clinic for quality of care	Chose clinic for emphasis on prevention
Age						
5–6 years	Ref	Ref	Ref	Ref	Ref	Ref
7–8 years	↑↑			↑		
9–10 years	↑↑		↑	↑↑	↓	
11–12 years	↑↑	↓	↑	↑↑		↑
13–14 years	↑↑		↑	↑↑		↑
Sex						
Male	Ref	Ref	Ref	Ref	Ref	Ref
Female						
Indigenous identity						
Non-Indigenous	Ref	Ref	Ref	Ref	Ref	Ref
Indigenous			↑		↓↓	↓
Parent country of birth						
Australian born	Ref	Ref	Ref	Ref	Ref	Ref
Overseas born						↓
Parental education						
School	Ref	Ref	Ref	Ref	Ref	Ref
Vocational training	↑	↓			↑	
Tertiary education	↑↑	↓↓		↓	↑↑	↑
Household income						
Low	Ref	Ref	Ref	Ref	Ref	Ref
Medium	↑	↓	↓	↓	↑	↑
High	↑↑	↓↓	↓↓	↓↓	↑↑	↑
Residential location						
Major city	Ref	Ref	Ref	Ref	Ref	Ref
Inner regional	↓	↑	↓	↑	↓	
Outer regional			↓↓	↑		
Remote/Very remote	↓	↑	↓			
Reason for last dental visit						
Check-up	Ref	Ref	Ref	Ref	Ref	Ref
Dental problem	↓↓	↑↑		↑↑	↓	↓

Ref=Reference group.
Symbols: ↓↓ Markedly lower; ↓ Lower; Not sig. different; ↑ Higher; ↑↑ Markedly higher.

5.3 Children's most recent dental visit

The characteristics of the child's most recent dental visit include the type of dental practice visited and the reason for that dental visit.

5.3.1 Place of visit

Australia-wide, around 50% of primary school-aged children receive care through a school dental service. The percentage coverage is lower among secondary school-aged children and varies between states and territories (Slade et al. 2007). In Queensland, public care is available to children of all ages through the Queensland Health's Child and Adolescent Oral Health Services (previously the School Dental program).

Public dental service

The percentage of children using public dental care would depend, among other factors, on the availability of and ease of access to public dental care (e.g. school dental service).

The most recent dental visit gives insight into how much public dental care was utilised by the Queensland child population. In the questionnaire parents were asked: 'Where was your child's last dental visit for general dental care?' with the response categories: 'School Dental Service clinic', 'Private practice', 'Public dental hospital or community clinic' and 'Health fund dental clinic'. Table 5.13 combines the first and third category reporting on public dental care.

More than half of all children (55.4%) utilised public dental care. A significant difference in percentages can be noted across age groups. Children aged 9–10 years were significantly more likely to use public dental services than children aged 5–6 and 13–14 years. A higher percentage of children from an Indigenous background (76.6%) than from a non-Indigenous background (53.7%) used a public dental service at their last visit. The difference between percentages was significant.

There were significant differences among the population groups by parental education. Children of parents with some tertiary education (44.0%) and children of parents with some vocational training (59.1%) were less likely to use public dental care than children of parents who had only school-level education (74.1%). This trend was apparent across all age groups.

More children from households with low income (75.0%) than with medium income (50.8%) and high income (32.4%) visited a public dental clinic for their last visit. The differences were statistically significant. Children from outer regional locations (60.5%) utilised public dental care more than those from major cities (50.4%). The percentage of children using public dental care was significantly higher for children who last visited for a dental problem (64.7%) than those who visited for a check-up (52.8%).

In summary, over half of all children used public dental care as opposed to private dental care for their most recent dental visit. Overall, use of public dental services was higher among socially disadvantaged groups of the community seen in the table as children from Indigenous backgrounds, those whose parents had only school-level education and those children from low income households. The proportion of children using public dental care was also higher for those who visited for a dental problem rather than a check-up when last visiting a dental professional.

Table 5.13: Percentage of children whose most recent dental visit was at the school dental service or a community dental clinic in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**55.4**	**45.5**	**57.4**	**64.9**	**56.4**	**50.3**
	52.0–58.8	*39.6–51.5*	*51.8–62.9*	*60.5–69.1*	*51.7–61.0*	*44.6–55.9*
Sex						
Male	54.2	48.2	56.0	63.1	53.9	47.7
	50.3–58.2	*40.7–55.7*	*48.8–62.9*	*57.6–68.3*	*47.9–59.8*	*39.9–55.7*
Female	56.7	42.9	59.0	67.1	58.7	53.0
	52.8–60.4	*36.1–50.1*	*52.5–65.3*	*61.4–72.3*	*53.3–63.8*	*45.8–60.0*
Indigenous identity						
Non-Indigenous	53.7	43.8	56.7	63.4	53.9	48.6
	50.3–57.1	*37.9–49.9*	*50.9–62.3*	*58.9–67.6*	*49.3–58.4*	*42.8–54.5*
Indigenous	76.6	73.4	65.8	80.6	87.7	73.1
	66.6–84.3	*53.7–86.7*	*51.5–77.7*	*64.2–90.7*	*73.3–94.9*	*57.0–84.7*
Parent country of birth						
Australian born	56.0	47.2	57.3	63.4	58.3	51.2
	52.0–59.8	*39.9–54.6*	*50.5–63.9*	*57.8–68.7*	*52.8–63.5*	*44.8–57.6*
Overseas born	54.6	42.9	57.5	67.0	53.6	48.9
	50.8–58.5	*36.3–49.8*	*50.3–64.4*	*61.6–72.0*	*47.1–60.0*	*41.0–56.9*
Parental education						
School	74.1	69.7	76.3	83.5	74.9	67.1
	69.9–77.9	*58.6–78.8*	*69.5–82.0*	*77.5–88.2*	*67.9–80.8*	*58.6–74.7*
Vocational training	59.1	58.7	62.2	66.8	54.9	51.9
	54.3–63.8	*48.5–68.3*	*52.8–70.8*	*58.3–74.3*	*46.2–63.3*	*42.8–60.9*
Tertiary education	44.0	32.0	46.5	55.1	47.4	36.0
	40.3–47.8	*26.3–38.3*	*40.1–53.1*	*49.7–60.4*	*42.2–52.7*	*29.2–43.3*
Household income						
Low	75.0	67.7	77.7	84.8	74.9	67.3
	70.9–78.8	*57.4–76.5*	*71.3–83.0*	*79.7–88.8*	*67.3–81.3*	*58.3–75.1*
Medium	50.8	41.5	51.7	59.2	54.7	45.2
	47.1–54.5	*34.8–48.5*	*44.3–59.0*	*53.9–64.2*	*49.2–60.1*	*38.1–52.4*
High	32.4	25.7	37.9	37.2	31.7	28.3
	27.9–37.2	*18.4–34.5*	*29.0–47.8*	*29.8–45.2*	*25.4–38.7*	*19.6–39.2*
Residential location						
Major city	50.4	40.9	53.7	61.0	48.7	45.2
	45.6–55.2	*33.5–48.7*	*45.7–61.5*	*54.6–67.1*	*42.2–55.3*	*36.8–53.8*
Inner regional	58.7	45.1	53.7	67.0	65.5	58.4
	52.2–65.0	*32.3–58.5*	*42.4–64.6*	*58.0–74.9*	*55.5–74.4*	*47.2–68.9*
Outer regional	60.5	55.0	67.4	68.5	62.2	49.2
	54.7–66.0	*42.7–66.7*	*60.5–73.6*	*59.8–76.1*	*53.2–70.4*	*41.7–56.7*
Remote/Very remote	64.7	54.6	65.2	73.9	63.9	62.7
	49.5–77.4	*35.4–72.5*	*41.3–83.2*	*60.8–83.7*	*43.6–80.2*	*42.6–79.2*
Reason for last dental visit						
Check-up	52.8	43.9	56.7	63.1	52.5	46.8
	49.2–56.4	*37.3–50.8*	*50.5–62.7*	*58.2–67.8*	*47.5–57.4*	*40.7–52.9*
Dental problem	64.7	51.8	59.5	70.1	71.1	66.1
	60.1–69.1	*40.5–62.9*	*50.2–68.3*	*63.2–76.2*	*63.0–78.1*	*55.2–75.6*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Private practice

Table 5.14 gives insight into how private dental care was used by the Queensland child population. It reports on a combination of the categories from the same question used for Table 5.13. 'Private practice' and 'Health fund dental clinic' are combined to account for use of private dental care at the child's most recent dental visit.

Just less than half of all children (44.6%) visited a private dental clinic when last visiting a dental provider. More children aged 5–6 years (54.5%) than 7–8 (42.6%), 9–10 (35.1%) and 11–12 years (43.6%) visited a private practice at their last dental visit.

More children from a non-Indigenous background (46.3%) than from an Indigenous background (23.4%) visited a private clinic.

Children whose parents had some vocational training were 1.6 times as likely to have visited a private dental clinic at their last visit as those whose parents had only school-level education. The rate was higher for children whose parents had some tertiary education, with 2.2 times the percentage of children whose parents had only school-level education visiting a private clinic at their most recent dental visit.

No significant differences were present for children grouped by sex, parents' country of birth and residential location.

More children from households with medium (49.2%) and high (67.6%) income utilised private dental care than children from households with low income (25.0).

Private dental care was used more by children who last visited for a check-up (47.2%) than for a dental problem (35.3%).

In summary, private dental services were used more by socially advantaged groups. Private dental clinics were more frequently attended at the last dental visit by children aged 5–6 years, children from a non-Indigenous background, children whose parents had some vocational training or some tertiary education, children from medium or high income households and those whose last dental visit was for check-up rather than a dental problem.

Table 5.14: Percentage of children whose most recent dental visit was at a private dental clinic in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**44.6**	**54.5**	**42.6**	**35.1**	**43.6**	**49.8**
	41.2–48.0	*48.5–60.4*	*37.1–48.2*	*30.9–39.6*	*39.0–48.3*	*44.1–55.4*
Sex						
Male	45.8	51.8	44.0	36.9	46.1	52.3
	41.8–49.8	*44.3–59.3*	*37.1–51.2*	*31.7–42.4*	*40.2–52.1*	*44.3–60.2*
Female	43.3	57.1	41.0	32.9	41.3	47.0
	39.6–47.2	*49.9–64.0*	*34.7–47.5*	*27.7–38.6*	*36.2–46.7*	*40.0–54.2*
Indigenous identity						
Non-Indigenous	46.3	56.2	43.3	36.6	46.1	51.4
	42.9–49.7	*50.1–62.1*	*37.7–49.2*	*32.4–41.1*	*41.6–50.7*	*45.5–57.2*
Indigenous	23.4	26.6	34.2	19.4	12.3	26.9
	15.8–33.4	*13.3–46.3*	*22.3–48.5*	*9.4–35.8*	*5.1–26.7*	*15.3–43.0*
Parent country of birth						
Australian born	44.1	52.8	42.7	36.6	41.7	48.8
	40.2–48.0	*45.4–60.1*	*36.1–49.5*	*31.3–42.2*	*36.5–47.2*	*42.4–55.2*
Overseas born	45.4	57.1	42.5	33.0	46.4	51.1
	41.5–49.2	*50.2–63.7*	*35.6–49.7*	*28.0–38.4*	*40.0–52.9*	*43.1–59.0*
Parental education						
School	25.9	30.3	23.7	16.5	25.1	32.9
	22.1–30.1	*21.2–41.4*	*18.0–30.5*	*11.8–22.5*	*19.2–32.1*	*25.3–41.4*
Vocational training	40.9	41.3	37.8	33.3	45.1	48.1
	36.2–45.7	*31.7–51.6*	*29.2–47.2*	*25.7–41.7*	*36.7–53.8*	*39.1–57.2*
Tertiary education	56.0	68.0	53.5	44.9	52.6	64.1
	52.2–59.7	*61.7–73.7*	*46.9–59.9*	*39.6–50.3*	*47.3–57.8*	*56.7–70.8*
Household income						
Low	25.0	32.3	22.3	15.2	25.1	32.7
	21.2–29.1	*23.5–42.6*	*17.0–28.7*	*11.2–20.3*	*18.7–32.7*	*24.9–41.7*
Medium	49.2	58.5	48.3	40.9	45.3	54.8
	45.5–52.9	*51.5–65.2*	*41.1–55.7*	*35.8–46.1*	*39.9–50.8*	*47.6–61.9*
High	67.6	74.4	62.1	62.8	68.3	71.7
	62.8–72.1	*65.5–81.6*	*52.2–71.0*	*54.8–70.2*	*61.3–74.6*	*60.9–80.4*
Residential location						
Major city	49.6	59.1	46.4	39.0	51.3	54.8
	44.8–54.4	*51.3–66.5*	*38.5–54.3*	*32.9–45.4*	*44.7–57.8*	*46.2–63.2*
Inner regional	41.3	54.9	46.3	33.0	34.5	41.6
	35.0–47.8	*41.5–67.7*	*35.4–57.7*	*25.1–42.0*	*25.7–44.6*	*31.2–52.8*
Outer regional	39.5	45.0	32.6	31.5	37.8	50.8
	34.0–45.3	*33.3–57.4*	*26.4–39.6*	*24.0–40.2*	*29.6–46.8*	*43.3–58.3*
Remote/Very remote	35.3	45.4	34.9	26.2	36.1	37.3
	22.6–50.5	*27.5–64.6*	*16.8–58.7*	*16.3–39.2*	*19.8–56.4*	*20.9–57.4*
Reason for last dental visit						
Check-up	47.2	56.1	43.3	36.9	47.5	53.2
	43.6–50.8	*49.2–62.7*	*37.3–49.5*	*32.2–41.8*	*42.6–52.5*	*47.1–59.3*
Dental problem	35.3	48.2	40.5	29.9	28.9	33.9
	30.9–39.9	*37.1–59.5*	*31.8–49.9*	*23.8–36.8*	*21.9–37.0*	*24.4–44.8*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Summary of findings

Table 5.15 presents an overview of characteristics of the child's most recent dental visit. Information from Tables 5.13 and 5.14 has been combined to compare these characteristics across population groups defined by age, sex, sociodemographic characteristics and reason for the last dental visit.

Less than half of children aged 5–6 years visited a public clinic at their last dental visit, compared to around 60% among the older age groups, except for ages 13–14 years. Use of public services dropped in this age group. Overall, there was a higher preference for public care evident in the middle age groups.

Twice the percentage of Indigenous children visited a public clinic at their last dental visit than non-Indigenous children. Children whose parents had some tertiary education were less than half as likely to have used a public dental clinic at their last visit as those children whose parents had only school-level education. Comparing low to high household income groups the difference was more pronounced, with children from low income households over two and a half times more likely to have visited a public clinic at their most recent dental visit than children from high income households.

A preference for utilisation of public dental care is logically associated with socioeconomic circumstances such as income, and was supported by the current data. Children with indicators of higher socioeconomic status, namely a non-Indigenous identity, a high level of parental education and high household income were more likely to have had their dental care at a private dental clinic.

There was a gradient across groups by residential location, with children in remote and very remote areas much more likely than those in major city areas to have visited a public clinic and therefore less likely to have received private dental care at their most recent visit.

Over half of children who last visited a dental provider for a check-up attended a public clinic, compared to almost two-thirds of those who visited for a problem. Thus, a lower percentage of children who last visited for a dental problem attended a private clinic.

There was no variation in the place of the child's most recent dental visit based on population groups by sex of the child and parents' country of birth.

Table 5.15: Summary of characteristics of child's most recent dental visit

	Most recent visit at public clinic	Most recent visit at private clinic
Age		
5–6 years	Ref	Ref
7–8 years	↑↑	↓↓
9–10 years	↑↑	↓↓
11–12 years	↑↑	↓↓
13–14 years	↑	↓
Sex		
Male	Ref	Ref
Female		
Indigenous identity		
Non-Indigenous	Ref	Ref
Indigenous	↑↑	↓↓
Parent country of birth		
Australian born	Ref	Ref
Overseas born		
Parental education		
School	Ref	Ref
Vocational training	↓↓	↑↑
Tertiary education	↓↓	↑↑
Household income		
Low	Ref	Ref
Medium	↓↓	↑↑
High	↓↓	↑↑
Residential location		
Major city	Ref	Ref
Inner regional	↑	↓
Outer regional	↑	↓
Remote/Very remote	↑↑	↓↓
Reason for last dental visit		
Check-up	Ref	Ref
Dental problem	↑↑	↓↓

Ref=Reference group.
Symbols: ↓↓ Markedly lower; ↓ Lower; Not sig. different; ↑ Higher; ↑↑ Markedly higher.

5.3.2 Parental rating of the most recent dental visit

A parental rating on the dental care received by their child at the child's most recent dental visit was a way to gauge the performance of the dental health care system. To assess parental satisfaction, parents were asked: 'At your child's last dental visit, how would you rate the dental care your child received?' The response options were 'Excellent', 'Very good', 'Good', 'Fair' or 'Poor'. Table 5.16 shows the percentage of parents who gave a high rating of 'Excellent' or 'Very good'.

More than three-quarters (76.8%) of children of all ages had their dental care rated highly. The percentage of high ratings tended to decrease across age groups, with the biggest decrease (3.4%) seen from children aged 5–6 years (80.4%) to children aged 7–8 years (77.0%). There were no significant differences between any of the age groups.

The highest percentage of children who had their dental care rated highly were in the high household income population group (82.9%). Indigenous children had the lowest percentage of ratings of 'Excellent' or 'Very good' (73.5%) for the dental care received at their most recent dental visit.

Among children of all ages, a significant difference of 6.4 percentage points was seen between children whose parents had only school-level education (73.6%) and children whose parents had some vocational training (80.0%). There were also significant differences between children from low income households (70.7%) and medium and high income households (78.9% and 82.9% respectively). The difference between medium and high income households was not significant.

Children living in a major city had the lowest percentage of high ratings (76.2%) of the most recent dental visit compared to other residential location groups (78.0% for inner regional, 77.3% for outer regional and 78.2% for remote/very remote). These differences were not significant. There were also no significant differences across population groups by sex, Indigenous identity, parental country of birth, or reason for last dental visit.

The largest differences were seen between children from high and low income households among ages 11–12 years with a difference of 16.0 percentage points, and medium and low income households among ages 13–14 years (13.8 percentage points). Both these differences were statistically significant, as were the differences between children from low income households and medium and high income households among the three oldest age groups. For example, the percentage among children aged 13–14 years was 67.1% for low income households compared to 80.9% in medium and 80.0% in high income households. There were also large differences between children whose parents had only school-level education and children whose parents had some vocational training among ages 11–12 years (13.0%) and 5–6 years (12.8%), but these differences were not significant.

In summary, children from a lower socioeconomic background were more likely to have parents rate the dental care their child received at their child's most recent dental visit lower than those from higher socioeconomic backgrounds, based on comparisons between groups defined by household income, parental education, and to a lesser degree, Indigenous identity and parents' country of birth.

Table 5.16: Percentage of children whose parents gave a high rating of the dental care their child received at the most recent dental visit in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All	**76.8**	**80.4**	**77.0**	**76.0**	**75.8**	**75.8**
	75.1–78.4	*76.2–84.1*	*73.6–80.1*	*73.0–78.7*	*72.7–78.7*	*71.5–79.7*
Sex						
Male	76.9	81.0	76.7	76.9	78.1	73.4
	74.3–79.3	*75.5–85.5*	*71.4–81.3*	*72.7–80.6*	*73.7–81.9*	*67.3–78.8*
Female	76.7	79.9	77.4	74.9	73.8	78.3
	74.5–78.6	*74.4–84.5*	*72.7–81.4*	*70.5–78.8*	*69.5–77.6*	*72.1–83.5*
Indigenous identity						
Non-Indigenous	77.0	80.8	76.3	76.7	76.5	76.0
	75.3–78.7	*76.4–84.5*	*72.6–79.6*	*73.5–79.6*	*73.3–79.4*	*71.6–80.0*
Indigenous	73.5	75.1	85.9	68.5	66.9	72.7
	66.8–79.3	*58.3–86.7*	*73.7–93.0*	*56.6–78.3*	*54.5–77.4*	*54.0–85.7*
Parent country of birth						
Australian born	77.9	79.6	78.5	77.4	77.3	77.2
	75.7–79.9	*74.0–84.2*	*74.0–82.5*	*73.4–80.9*	*73.4–80.8*	*71.7–81.9*
Overseas born	75.2	81.7	74.6	74.0	73.7	74.0
	72.5–77.7	*75.7–86.5*	*69.0–79.5*	*69.6–78.0*	*68.3–78.5*	*66.4–80.4*
Parental education						
School	73.6	76.7	75.2	74.2	69.6	73.9
	70.5–76.5	*67.9–83.7*	*67.8–81.4*	*67.8–79.7*	*63.4–75.1*	*66.4–80.2*
Vocational training	80.0	89.5	76.8	73.4	82.6	81.4
	76.7–82.9	*83.6–93.5*	*68.6–83.4*	*67.0–78.9*	*75.0–88.3*	*73.0–87.7*
Tertiary education	77.5	79.7	77.6	78.5	77.1	74.9
	75.2–79.7	*73.8–84.6*	*73.3–81.4*	*74.3–82.2*	*72.9–80.7*	*68.2–80.6*
Household income						
Low	70.7	76.8	75.4	70.0	67.5	67.1
	67.7–73.5	*68.4–83.6*	*67.7–81.8*	*64.9–74.7*	*61.3–73.2*	*59.5–73.9*
Medium	78.9	79.5	75.1	79.2	79.4	80.9
	76.5–81.0	*73.7–84.3*	*70.0–79.5*	*74.8–83.0*	*74.9–83.3*	*75.2–85.5*
High	82.9	87.7	82.2	82.1	83.5	80.0
	79.2–86.0	*80.6–92.4*	*75.0–87.6*	*75.9–87.0*	*77.7–88.0*	*67.0–88.8*
Residential location						
Major city	76.2	82.1	75.2	72.3	76.0	77.0
	73.7–78.6	*76.5–86.7*	*69.9–79.8*	*68.0–76.2*	*71.5–80.1*	*69.4–83.1*
Inner regional	78.0	82.7	84.3	78.9	76.2	71.1
	74.4–81.2	*73.8–89.1*	*76.0–90.1*	*72.0–84.5*	*69.8–81.6*	*62.6–78.3*
Outer regional	77.3	72.6	73.7	81.8	75.7	79.8
	73.5–80.7	*61.5–81.5*	*66.9–79.5*	*74.4–87.5*	*68.3–81.9*	*72.6–85.5*
Remote/Very remote	78.2	83.2	84.5	77.4	75.6	70.1
	73.9–82.0	*66.5–92.5*	*74.8–90.9*	*67.8–84.7*	*67.0–82.6*	*56.9–80.6*
Reason for last dental visit						
Check-up	76.5	80.3	76.6	74.8	75.9	76.2
	74.5–78.4	*75.5–84.4*	*71.9–80.7*	*71.1–78.1*	*72.4–79.0*	*71.8–80.1*
Dental problem	77.7	80.9	78.4	79.5	75.7	74.3
	74.0–81.0	*71.9–87.6*	*70.9–84.4*	*73.6–84.3*	*67.5–82.3*	*63.2–82.9*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

5.3.3 Summary of findings

Table 5.17 is a summary of Table 5.15, showing a comparison across population groups defined by age, sex, sociodemographic characteristics and reason for the last dental visit.

The percentage of high ratings by parents for dental care at the child's last dental visit was slightly lower for all older age groups using ages 5–6 years as a reference. The percentage was also lower for Indigenous children and children of parents born outside of Australia. Using children whose parents had only school-level education as a reference, a higher percentage of high ratings was seen for both children whose parents had some vocational training or some tertiary education. These were not large differences.

The one marked difference was between household income groups. The high household income group had a markedly higher percentage of high parental ratings of the child's most recent dental visit.

There was no variation in the high rating of the child's most recent dental visit between population groups by sex of the child, residential location and reason for the last dental visit.

Table 5.17: Summary of high dental care rating at child's most recent dental visit

	Parental rating of most recent dental visit
Age	
5–6 years	Ref
7–8 years	↓
9–10 years	↓
11–12 years	↓
13–14 years	↓
Sex	
Male	Ref
Female	
Indigenous identity	
Non-Indigenous	Ref
Indigenous	↓
Parent country of birth	
Australian born	Ref
Overseas born	↓
Parental education	
School	Ref
Vocational training	↑
Tertiary education	↑
Household income	
Low	Ref
Medium	↑
High	↑↑
Residential location	
Major city	Ref
Inner regional	
Outer regional	
Remote/Very remote	
Reason for last dental visit	
Check-up	Ref
Dental problem	

Ref=Reference group.
Symbols: ↓↓ Markedly lower; ↓ Lower; Not sig. different; ↑ Higher; ↑↑ Markedly higher.

6. Oral health behaviours

By Jason Armfield and Katie Beckwith

The analysis provided in this chapter is based on guidelines for the use of fluoridated toothpaste, as outlined by ARCPOH and published in the Australian Dental Journal in 2006.

6.1 Patterns of toothbrushing practices

Brushing teeth with fluoride-containing toothpaste is the most widely used method of home dental care by people in Western countries. Exposure to fluoride from toothpaste is recognised as an effective method of reducing the risk of developing dental caries. Brushing with fluoride toothpaste increases the resistance of tooth enamel to acid attack, and slows the development of carious lesions by inhibiting demineralisation and enhancing remineralisation of the tooth enamel.

Regular toothbrushing is also recommended by most dentists in order to improve plaque control, which has been implicated in the aetiology of dental caries, gingivitis and periodontitis.

6.1.1 Age of commencement of toothbrushing

Early commencement

Parents were asked: 'At what age did your child start brushing with toothpaste (with or without help from an adult)?' and indicated age by years and months, or that their child had never brushed with toothpaste. Parents of older children at the time of the study, compared to parents of younger children, had to remember further back in time, meaning that estimates based on these recollections might be more prone to either bias or random error.

In order to avoid the possible risk of developing dental fluorosis, it is recommended that children commence having their teeth brushed with toothpaste from the age of 18 months (ARCPOH 2006). Table 6.1 shows that approximately one-half (48.0%) of children commenced using toothpaste before the age of 18 months. There were non-significant differences in early commencement of toothbrushing by current age of children, with percentages varying from 45.5% to 51.3% across age groups.

There were consistent differences in the percentage of children having their teeth brushed with toothpaste prior to the age of 18 months across various demographic and socioeconomic groups. Non-Indigenous children were more likely to have commenced toothbrushing early, with absolute differences across the two-year age groups ranging from 4.3% to 17.5% and these differences being largest for children who were older at the time of study. Across all children, 48.8% of non-Indigenous children started brushing with toothpaste before the age of 18 months, in contrast to only 37.5% of Indigenous children.

Children of Australian-born parents were also more likely to have an earlier commencement of toothbrushing, with 50.8% of Australian-born children starting brushing with toothpaste before the age of 18 months, compared to 44.0% of overseas-born children. However, there was much variation by child age with, for example, 12% more Australian-born children (52.2%) than overseas-born children (40.2%) starting brushing early at age 11–12, but little difference apparent at age 13–14.

Children whose parents had only school-level education were less likely to have commenced brushing with toothpaste prior to the age of 18 months compared to children whose parents had some vocational training or some level of tertiary education. These differences were apparent across all two-year age groups examined, with absolute differences ranging from 5.2% (11–12 years) to 14.6% (13–14 years). The differences in commencement of brushing with fluoride toothpaste did not vary significantly between children of parents with vocational training and those with tertiary education.

The percentage of children from families with low household income (43.2%) were less likely to commence brushing prior to the age of 18 months, compared to children from medium (50.5%) and high income households (53. 9%). Other than for children aged 13–14, absolute differences across age-groups ranged from 6.9% for children aged 7–8 years to 10.6% for children aged 5–6 years.

There were no statistically significant differences in early commencement of toothbrushing by sex of the child, residential location or reason for last dental visit. Some differences were evident in early brushing commencement by residential location for some specific two-year age groups; however these differences were not statistically significant.

Table 6.1: Percentage of children who first brushed teeth with toothpaste before the age of 18 months in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All children	**48.0**	**51.3**	**49.5**	**46.4**	**47.3**	**45.5**
	46.2–49.8	*47.9–54.7*	*45.2–53.7*	*43.0–49.7*	*44.0–50.6*	*41.5–49.7*
Sex						
Male	48.6	51.3	51.3	45.5	47.4	47.7
	46.0–51.2	*46.6–56.0*	*45.6–57.1*	*41.3–49.8*	*42.5–52.2*	*41.6–53.8*
Female	47.3	51.3	47.3	47.4	47.2	43.2
	45.0–49.7	*46.4–56.2*	*41.8–52.9*	*42.8–52.0*	*43.2–51.3*	*38.2–48.4*
Indigenous identity						
Non-Indigenous	48.8	51.8	49.8	47.8	48.6	46.2
	47.0–50.7	*48.3–55.2*	*45.3–54.3*	*44.3–51.4*	*45.3–51.9*	*42.0–50.5*
Indigenous	37.5	44.5	45.5	30.3	31.7	36.7
	30.8–44.6	*30.1–59.9*	*34.7–56.6*	*18.9–44.8*	*20.7–45.2*	*24.3–51.0*
Parent country of birth						
Australian born	50.8	54.4	53.1	48.7	52.2	45.3
	48.4–53.1	*49.2–59.6*	*47.6–58.5*	*44.3–53.2*	*47.9–56.4*	*40.4–50.3*
Overseas born	44.0	46.5	44.1	43.1	40.2	45.9
	41.0–47.0	*40.9–52.3*	*37.8–50.6*	*37.4–48.9*	*34.7–45.9*	*39.2–52.6*
Parental education						
School	40.2	46.0	40.3	37.4	41.8	36.7
	37.1–43.5	*38.1–54.2*	*33.3–47.7*	*31.4–43.8*	*35.5–48.4*	*30.0–43.9*
Vocational training	51.6	57.6	54.3	46.9	47.0	51.3
	47.5–55.6	*49.4–65.5*	*45.6–62.7*	*39.7–54.1*	*39.0–55.2*	*41.0–61.6*
Tertiary education	51.2	51.6	54.2	50.2	50.4	49.5
	49.0–53.4	*46.6–56.7*	*48.6–59.7*	*45.2–55.2*	*45.9–54.9*	*43.5–55.6*
Household income						
Low	43.2	45.6	43.8	39.7	41.4	45.5
	39.9–46.5	*39.0–52.4*	*37.1–50.7*	*33.5–46.3*	*35.5–47.6*	*37.5–53.8*
Medium	50.5	56.2	50.7	48.4	51.3	44.9
	47.7–53.2	*50.8–61.5*	*44.1–57.4*	*43.8–53.0*	*46.2–56.3*	*37.7–52.2*
High	53.9	53.2	59.7	55.9	52.4	48.3
	49.6–58.2	*45.4–60.9*	*51.0–67.8*	*47.7–63.7*	*45.2–59.5*	*39.0–57.7*
Residential location						
Major city	48.3	52.7	49.2	46.1	45.9	47.1
	45.5–51.1	*48.0–57.5*	*42.9–55.4*	*41.6–50.6*	*41.0–50.9*	*40.4–53.8*
Inner regional	49.6	55.3	47.2	55.3	52.1	39.5
	45.5–53.7	*47.1–63.1*	*36.6–58.1*	*45.1–65.0*	*46.8–57.3*	*31.7–48.0*
Outer regional	47.1	48.7	48.5	43.0	49.7	46.0
	44.3–49.9	*41.5–55.9*	*42.3–54.6*	*37.3–48.9*	*43.1–56.3*	*38.6–53.5*
Remote/Very remote	45.4	38.7	59.2	38.9	38.0	55.0
	38.6–52.3	*28.5–49.9*	*47.5–69.9*	*27.2–51.9*	*28.0–49.2*	*41.6–67.6*
Reason for last dental visit						
Check-up	48.8	55.1	50.4	46.9	48.0	45.5
	46.7–50.9	*50.4–59.7*	*45.2–55.6*	*43.3–50.6*	*44.3–51.8*	*41.0–50.1*
Dental problem	46.5	44.0	50.1	44.8	46.2	46.6
	42.6–50.5	*34.6–54.0*	*42.1–58.2*	*38.3–51.6*	*38.9–53.7*	*37.3–56.2*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Late commencement

While early brushing with toothpaste is considered a risk factor for dental fluorosis, late commencement of brushing with fluoride toothpaste places a child at risk of developing dental caries. It is currently recommended that parents commence brushing their children's teeth with fluoride toothpaste from the age of 18 months (ARCPOH 2006), although past recommendations have been for toothbrushing to commence from the age of 24 months (2 years) of age and this advice is still carried on the packaging of some children's toothpastes. Based on the current scenario, it is considered that significantly delayed toothbrushing could be defined as anywhere from the age of 30 months (2.5 years) onwards.

Table 6.2 shows the percentages of children across different age groups who commenced having their teeth brushed with toothpaste at age 30 months or later. Across all children, just under one-fifth (18.2%) had significantly delayed commencement of brushing with toothpaste. There was little difference by age of children at the time of participation in the Survey, although there is some evidence of a small trend, with percentages being least for the youngest age group (16.1%) and highest for the oldest two age-groups (21.1% and 19.5%, respectively).

Compared to non-Indigenous children, Indigenous children were more than twice as likely to have delayed brushing commencement, with more than one-third (35.3%) not starting to brush with toothpaste until the age of 30 months or later. These differences in past brushing practice are evident irrespective of the current age of the children.

Children whose parents were born outside of Australia were also significantly more likely to have later brushing commencement. Across all ages, 15% of Australian-born children commenced brushing with toothpaste at the age of 30 months or later, compared to 22.9% of children whose parents were born overseas. Similar differences by parents' country of birth were seen across the various child age groups.

Socioeconomic differences were also evident in late commencement of brushing with toothpaste. Children whose parents had received some level of tertiary education or vocational training were less likely to have delayed brushing commencement than children whose parents had only school-level education. In relation to household income, a gradient could be seen in the percentages of children who commenced brushing from 30 months of age or older. Delayed toothbrushing was 11.0% for children from high income families, 15.7% for children from medium income families, and 23.7% for children from low income families.

Children who had made their last dental visit for a dental problem were also more likely to have a delayed commencement of brushing with toothpaste than children who last visited the dentist for a check-up. This result was driven by large reported differences in late toothbrushing commencement for children aged 5–6 years and for children aged 11-12 years.

Table 6.2: Percentage of children who first brushed teeth with toothpaste at age 30 months or older in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All children	**18.2**	**16.1**	**16.3**	**18.1**	**21.1**	**19.5**
	16.5–20.1	*13.4–19.3*	*13.5–19.7*	*15.5–21.0*	*18.1–24.5*	*16.4–23.0*
Sex						
Male	18.5	15.8	16.2	18.7	22.2	19.6
	16.3–20.8	*12.2–20.2*	*12.6–20.6*	*15.6–22.2*	*18.5–26.4*	*14.9–25.4*
Female	18.0	16.5	16.5	17.3	20.0	19.3
	15.7–20.4	*13.0–20.7*	*12.5–21.4*	*13.8–21.6*	*16.1–24.6*	*14.6–25.1*
Indigenous identity						
Non-Indigenous	16.9	14.8	15.4	16.3	19.0	18.8
	15.3–18.6	*12.3–17.6*	*12.5–18.9*	*13.8–19.0*	*16.2–22.0*	*15.7–22.5*
Indigenous	35.3	35.6	27.1	37.8	46.8	28.7
	27.0–44.7	*18.7–57.0*	*16.6–40.9*	*25.9–51.3*	*32.5–61.6*	*17.2–43.7*
Parent country of birth						
Australian born	15.0	13.4	12.4	15.7	17.4	16.1
	13.2–17.0	*10.5–16.9*	*9.7–15.7*	*12.7–19.4*	*14.0–21.4*	*12.4–20.7*
Overseas born	22.9	20.3	22.1	21.3	26.4	24.2
	20.2–25.8	*15.8–25.6*	*16.9–28.4*	*17.1–26.2*	*21.5–32.1*	*18.5–31.0*
Parental education						
School	24.5	21.7	24.0	24.3	26.3	25.6
	20.9–28.5	*16.7–27.7*	*18.2–31.0*	*18.3–31.5*	*19.9–34.0*	*18.2–34.7*
Vocational training	15.4	14.2	12.5	16.9	22.8	11.4
	13.0–18.2	*9.8–20.2*	*7.7–19.5*	*12.3–22.6*	*16.7–30.3*	*6.9–18.4*
Tertiary education	15.2	13.5	12.9	15.2	16.5	18.3
	13.5–17.1	*10.5–17.3*	*9.8–16.8*	*12.2–18.8*	*13.2–20.3*	*14.0–23.5*
Household income						
Low	23.7	24.4	24.1	22.3	27.1	21.3
	20.7–27.0	*19.1–30.5*	*18.4–30.8*	*17.4–28.1*	*21.4–33.6*	*15.6–28.3*
Medium	15.7	10.3	13.7	16.7	18.0	20.7
	13.8–17.9	*7.5–13.9*	*9.6–19.0*	*13.3–20.6*	*14.3–22.4*	*15.1–27.7*
High	11.0	13.4	7.2	8.9	13.6	11.9
	8.7–13.8	*8.3–21.0*	*4.3–11.9*	*5.6–13.8*	*9.3–19.6*	*6.5–20.7*
Residential location						
Major city	19.5	16.2	17.0	20.1	22.5	22.2
	17.1–22.3	*12.7–20.3*	*12.8–22.1*	*16.5–24.3*	*18.4–27.2*	*16.9–28.7*
Inner regional	15.0	10.6	15.3	10.4	20.8	17.5
	12.1–18.5	*6.2–17.4*	*9.3–24.2*	*5.5–18.9*	*15.7–27.1*	*11.9–24.8*
Outer regional	16.9	16.9	17.7	17.1	16.7	16.2
	14.7–19.3	*12.9–21.9*	*13.1–23.6*	*13.4–21.5*	*12.2–22.4*	*11.9–21.8*
Remote/Very remote	20.8	27.4	13.6	24.0	22.3	14.8
	12.2–33.4	*14.7–45.3*	*6.8–25.6*	*13.1–39.6*	*9.1–44.9*	*6.6–29.7*
Reason for last dental visit						
Check-up	16.9	12.4	15.3	17.5	18.7	19.1
	15.1–18.9	*9.5–16.0*	*12.0–19.3*	*14.7–20.8*	*15.7–22.1*	*15.6–23.2*
Dental problem	22.1	28.5	17.8	19.0	28.0	19.7
	18.8–25.8	*19.8–39.2*	*12.4–24.9*	*13.9–25.3*	*21.7–35.4*	*14.0–27.0*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

6.1.2 Frequency of toothbrushing

It is recommended that children brush their teeth at least twice per day with fluoride toothpaste, a frequency which is believed to provide acceptable exposure to fluoride in the toothpaste and to aid with plaque control (ARCPOH 2006). While there is strong evidence that brushing teeth once daily with fluoride toothpaste has a significant caries preventive effect compared to a placebo, this effect is stronger when brushing is performed twice daily (Twetman 2009). Parents were asked: 'How often does your child brush his/her teeth with toothpaste?' and could respond 'Less than once a day', 'Once a day', 'Twice a day' or 'More than twice a day'.

Table 6.3 shows the percentages of children who brushed their teeth with toothpaste twice or more per day at the time of their participation in the Survey. Overall, just under three-quarters (73.1%) of children brushed their teeth the recommended two or more times per day. There was little variation across age groups, with percentages ranging from 71.2% of children aged 5–6 years to 74.7% of those aged 9–10 years.

Overall, Indigenous children were less likely to brush their teeth two or more times daily, with 62.9% engaging in this oral health behaviour compared to 73.6% of non-Indigenous children. Interestingly though, the difference in percentage was greatest for the youngest children (17.7% for 5–6 years), but progressively decreased across age groups so that there were no differences for the oldest children.

While there was some evidence of a gradient in toothbrushing frequency across parental education categories, the largest differences were found between children of parents with some tertiary education and children of those parents with less education. Variations in brushing frequency by parental education did not differ to any significant extent by the age of the children.

A more pronounced gradient in brushing frequency was found for household income, with consistent increases in the percentage of children brushing twice daily from low income households (66.1%), medium income households (75.0%) and high income households (81.9%). This gradient was evident across each of the two-year age groups analysed in this report.

Other smaller differences in toothbrushing frequency can be seen in Table 6.3. Overall, and for all age groups, a higher percentage of girls brushed twice or more per day than boys although these differences varied and did not reach statistical significance. Similarly, children whose parents were born overseas and children who last went to the dentist for a check-up were more likely to brush twice a day, but these differences were not statistically significant.

Table 6.3: Percentage of children who brush their teeth at least twice a day in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All children	**72.8**	**71.2**	**74.5**	**74.7**	**71.3**	**72.2**
	70.6–74.8	*67.4–74.7*	*70.3–78.4*	*71.1–77.9*	*67.8–74.5*	*67.9–76.2*
Sex						
Male	70.9	69.4	74.3	74.3	69.3	66.7
	68.0–73.6	*64.6–73.8*	*68.1–79.5*	*69.8–78.3*	*64.6–73.7*	*60.2–72.7*
Female	74.8	72.9	74.8	75.2	73.0	78.1
	72.4–77.0	*67.9–77.5*	*70.0–79.1*	*70.7–79.1*	*68.3–77.3*	*72.4–82.8*
Indigenous identity						
Non-Indigenous	73.6	72.3	76.6	75.4	71.8	72.0
	71.5–75.6	*68.6–75.8*	*72.1–80.5*	*71.8–78.7*	*68.3–75.1*	*67.6–75.9*
Indigenous	62.9	54.6	52.5	67.3	64.9	75.7
	54.3–70.8	*39.2–69.1*	*37.7–66.9*	*55.4–77.4*	*50.2–77.2*	*58.8–87.2*
Parent country of birth						
Australian born	71.2	69.2	73.1	74.4	72.1	67.2
	68.5–73.8	*64.6–73.4*	*67.0–78.5*	*69.9–78.5*	*68.1–75.8*	*61.3–72.6*
Overseas born	75.0	74.2	76.6	75.0	70.0	79.0
	72.2–77.6	*68.1–79.4*	*71.2–81.3*	*70.1–79.4*	*64.5–75.1*	*73.3–83.7*
Parental education						
School	63.5	64.2	63.9	63.2	61.3	64.7
	59.4–67.3	*56.6–71.1*	*56.2–70.9*	*56.6–69.3*	*54.5–67.7*	*56.7–71.9*
Vocational training	68.6	67.7	72.2	71.0	66.4	65.3
	65.2–71.8	*59.9–74.5*	*63.7–79.4*	*64.1–77.0*	*58.0–73.9*	*54.8–74.5*
Tertiary education	80.0	76.7	82.7	82.1	78.4	80.6
	78.1–81.8	*72.4–80.4*	*78.8–86.0*	*78.2–85.4*	*74.5–81.9*	*75.5–84.8*
Household income						
Low	66.1	66.8	71.1	66.2	63.8	63.2
	62.7–69.4	*60.1–72.9*	*64.5–77.0*	*60.3–71.7*	*58.1–69.2*	*55.0–70.8*
Medium	75.0	73.8	75.8	79.0	74.6	71.7
	72.0–77.7	*68.3–78.6*	*68.5–81.9*	*74.6–82.9*	*69.4–79.2*	*64.3–78.1*
High	81.9	78.2	82.5	82.2	78.9	87.6
	79.0–84.5	*69.6–84.9*	*76.6–87.2*	*76.6–86.7*	*72.8–84.0*	*80.4–92.4*
Residential location						
Major city	74.5	73.5	75.9	74.3	72.0	76.9
	71.6–77.2	*68.2–78.2*	*70.2–80.8*	*69.1–78.8*	*66.8–76.6*	*71.3–81.7*
Inner regional	69.2	70.7	73.7	72.2	66.1	64.4
	62.5–75.2	*59.4–79.9*	*61.9–82.9*	*61.3–81.0*	*58.8–72.7*	*52.8–74.5*
Outer regional	74.2	69.4	78.8	80.5	74.1	68.4
	71.1–77.1	*63.6–74.7*	*72.6–83.9*	*74.8–85.1*	*70.1–77.6*	*61.0–75.0*
Remote/Very remote	66.1	61.0	60.2	66.6	69.9	76.2
	58.0–73.3	*49.9–71.1*	*45.4–73.3*	*56.8–75.1*	*53.0–82.8*	*58.5–88.0*
Reason for last dental visit						
Check-up	75.4	77.0	77.5	77.0	72.9	73.4
	73.1–77.5	*72.8–80.8*	*73.1–81.4*	*73.4–80.3*	*69.0–76.4*	*68.5–77.8*
Dental problem	69.6	68.1	72.4	70.0	69.2	67.4
	65.6–73.4	*58.2–76.6*	*64.5–79.1*	*62.9–76.2*	*61.9–75.7*	*55.8–77.3*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

6.1.3 Type of toothpaste used

Low-fluoride toothpaste has been widely available in Australia since the early 1990s and its introduction was based on review processes that identified the early ingestion of standard fluoride toothpaste up to the age of 6 years as being a risk factor for the development of dental fluorosis. It is recommended that children consume low-fluoride toothpaste (approximately 400–550ppm) between the ages of 18 months and 5 years, and that standard fluoride toothpaste (approximately 1000-1450ppm) be consumed from the age of 6 onwards in order to protect children from dental caries (ARCPOH 2006). Parents were asked: 'What type of toothpaste does your child use?' with response options 'Standard fluoride toothpaste', 'Children's toothpaste', 'Non-fluoride toothpaste' and Don't know/not sure'.

Rather than there being a substantial transition at around the age of 6 years, the percentage of children consuming standard fluoride toothpaste increased sharply, but consistently, across all child age groups, from 24.2% of children aged 5–6 years to 94.8% of those aged 13–14 years (Table 6.4). Despite recommendations to brush with standard fluoride toothpaste from the age of 6 onwards, less than half of children aged 7–8 years were using standard fluoride toothpaste.

There was no overall association between children's Indigenous identity and whether they brushed with standard strength fluoride toothpaste. There was a tendency for a greater percentage of Indigenous compared to non-Indigenous children to use standard fluoride toothpaste among younger age groups, and the reverse among older age groups. Among children aged 13–14 years, however, almost all (99.3%) Indigenous children used standard toothpaste, which was significantly greater than the percentage for non-Indigenous children (94.5%).

Children of Australian-born parents, compared to those whose parents were born overseas, were more likely to be using standard fluoride toothpaste across all ages. Also, at the age of 5–6 years, those children from the families with low household income and who had parents with the least education were more likely to be using standard fluoride toothpaste. However, these differences were not apparent amongst older children.

There were no significant differences in the percentage of children brushing their teeth with standard fluoride toothpaste across sex, residential location or dental visiting categories.

Table 6.4: Percentage of children who brush their teeth with standard fluoridated toothpaste in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All children	**65.6**	**24.2**	**48.0**	**74.5**	**86.9**	**94.8**
	63.4–67.8	*20.6–28.1*	*44.2–51.7*	*71.5–77.3*	*84.4–89.1*	*92.6–96.4*
Sex						
Male	63.8	24.0	44.6	70.1	86.7	94.3
	60.9–66.6	*19.2–29.5*	*39.6–49.8*	*65.6–74.2*	*83.0–89.7*	*91.0–96.4*
Female	67.6	24.3	51.8	79.9	87.1	95.4
	64.7–70.3	*19.9–29.4*	*45.9–57.6*	*75.5–83.7*	*83.3–90.2*	*91.9–97.4*
Indigenous identity						
Non-Indigenous	65.5	23.2	47.6	75.0	87.7	94.5
	63.1–67.8	*19.8–26.9*	*43.6–51.6*	*71.7–78.0*	*85.1–89.9*	*92.2–96.2*
Indigenous	67.3	38.0	51.9	69.7	78.3	99.3
	61.7–72.4	*24.8–53.3*	*39.3–64.3*	*58.8–78.8*	*69.4–85.1*	*97.3–99.8*
Parent country of birth						
Australian born	68.0	25.7	52.1	76.9	91.8	96.0
	65.5–70.4	*21.4–30.5*	*47.2–56.8*	*73.1–80.2*	*89.1–93.9*	*93.4–97.6*
Overseas born	62.2	21.9	41.8	71.2	80.0	93.2
	59.0–65.4	*17.0–27.8*	*36.5–47.4*	*66.3–75.7*	*75.3–84.0*	*88.8–96.0*
Parental education						
School	69.6	34.2	48.9	77.9	83.8	96.5
	65.8–73.2	*27.0–42.2*	*42.4–55.5*	*71.7–83.1*	*79.1–87.7*	*92.9–98.4*
Vocational training	66.4	22.9	45.5	81.3	93.9	95.2
	62.1–70.4	*16.6–30.7*	*36.1–55.2*	*74.6–86.5*	*88.8–96.8*	*89.1–98.0*
Tertiary education	63.8	20.7	48.6	71.5	87.2	94.1
	61.2–66.2	*16.8–25.1*	*43.5–53.9*	*67.1–75.5*	*83.7–90.0*	*90.5–96.4*
Household income						
Low	67.6	30.6	51.3	71.9	85.4	94.1
	64.1–70.9	*24.2–37.9*	*44.9–57.6*	*66.6–76.7*	*80.4–89.3*	*89.8–96.7*
Medium	64.6	21.7	44.7	77.4	88.9	96.5
	61.4–67.7	*17.8–26.2*	*38.6–50.9*	*72.5–81.6*	*84.9–91.8*	*93.3–98.2*
High	65.2	17.5	48.7	75.3	88.2	95.6
	61.2–69.1	*11.4–25.9*	*41.4–56.2*	*68.6–81.0*	*82.4–92.2*	*90.6–98.0*
Residential location						
Major city	64.4	24.3	48.8	74.5	84.4	93.4
	61.3–67.4	*19.1–30.3*	*43.9–53.8*	*69.8–78.6*	*80.2–87.8*	*89.3–96.0*
Inner regional	65.7	20.2	43.7	74.9	89.4	96.7
	59.5–71.3	*14.2–28.0*	*35.0–52.8*	*66.7–81.6*	*83.5–93.3*	*90.8–98.8*
Outer regional	68.4	25.8	47.6	75.2	90.1	94.7
	64.8–71.7	*19.5–33.3*	*41.3–53.9*	*69.4–80.2*	*86.4–92.9*	*91.4–96.8*
Remote/Very remote	65.4	29.4	52.0	73.0	87.4	99.6
	58.0–72.2	*17.9–44.3*	*38.9–64.9*	*64.0–80.5*	*79.3–92.7*	*97.1–100.0*
Reason for last dental visit						
Check-up	69.0	22.7	47.0	74.8	87.6	95.6
	66.6–71.3	*18.9–27.0*	*42.8–51.2*	*71.2–78.2*	*84.8–89.9*	*93.5–97.1*
Dental problem	67.2	25.2	51.6	73.1	85.6	91.0
	63.5–70.7	*17.9–34.2*	*44.1–59.0*	*66.9–78.6*	*79.9–89.9*	*83.4–95.3*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

6.1.4 The amount of toothpaste used

It is recommended that children use a pea-sized amount of fluoride-containing toothpaste when brushing their teeth (ARCPOH 2006). Use of a large amount of fluoride toothpaste is considered a potential risk factor for dental fluorosis. Parents were asked: 'How much toothpaste does your child (or do you) usually use on his/her toothbrush?' Pictorial representations of a smear, a pea-sized amount and a large amount were provided for parents to indicate.

The percentage of children brushing their teeth with a pea-sized amount of toothpaste, in contrast to either a large or small amount, is shown in Table 6.5. There was a general decrease in the percentages of children using a pea-sized amount of toothpaste when brushing their teeth across older age groups, declining from about 63% for younger children to 42.7% for the oldest age group.

Differences in the use of a pea-sized amount of toothpaste can be seen in relation to children's Indigenous identity, parents' education and household income (Table 6.5). Indigenous children were less likely than non-Indigenous children to be using a pea-sized amount of toothpaste when brushing. Differences across age groups ranged from 10.7% less among children aged 5–6 years to 24.6% less for children aged 7–8 years.

Children whose parents had only school-level education, children from families with low household incomes and children who resided in remote or very remote locations were also less likely to use a pea-sized amount of toothpaste. There were no significant differences in the amount of toothpaste used by sex of the child, parents' country of birth, or the reason for the child's last dental visit.

Table 6.5: Percentage of children who used a pea-sized amount of toothpaste when brushing their teeth in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All children	**55.8**	**63.5**	**63.9**	**58.2**	**50.7**	**42.7**
	53.8–57.7	*59.9–66.9*	*60.5–67.2*	*54.7–61.6*	*47.3–54.0*	*38.1–47.5*
Sex						
Male	55.8	62.4	62.1	57.3	51.4	45.3
	53.3–58.2	*57.0–67.6*	*56.9–67.1*	*52.6–61.9*	*46.1–56.7*	*38.2–52.6*
Female	55.7	64.5	65.9	59.3	50.0	40.0
	53.1–58.3	*59.3–69.4*	*60.6–70.8*	*54.3–64.1*	*45.7–54.3*	*33.9–46.3*
Indigenous identity						
Non-Indigenous	57.0	64.2	66.0	60.1	51.7	43.6
	55.1–58.9	*60.5–67.6*	*62.5–69.3*	*56.7–63.3*	*48.1–55.3*	*38.8–48.4*
Indigenous	40.6	53.5	41.4	39.6	38.4	30.9
	34.3–47.3	*38.1–68.3*	*30.0–53.8*	*29.4–50.7*	*26.8–51.5*	*17.9–47.8*
Parent country of birth						
Australian born	55.1	63.1	64.4	55.6	49.1	43.0
	52.9–57.4	*58.5–67.6*	*60.1–68.5*	*51.2–60.0*	*44.6–53.6*	*37.7–48.4*
Overseas born	56.6	64.0	63.1	61.8	53.0	42.4
	53.6–59.6	*58.5–69.1*	*57.1–68.7*	*56.7–66.6*	*47.3–58.6*	*34.4–50.9*
Parental education						
School	46.7	58.1	55.7	48.0	41.8	33.6
	43.0–50.5	*51.0–64.9*	*48.5–62.6*	*40.1–56.0*	*36.0–47.9*	*26.9–41.0*
Vocational training	58.3	61.7	66.0	62.2	53.5	46.8
	54.7–61.8	*53.7–69.1*	*58.5–72.9*	*55.0–68.8*	*45.1–61.7*	*37.5–56.3*
Tertiary education	59.9	66.2	68.1	61.5	54.5	48.2
	57.4–62.3	*61.6–70.5*	*62.8–73.0*	*56.5–66.2*	*49.9–59.1*	*41.5–55.0*
Household income						
Low	51.4	58.8	60.1	57.3	44.7	37.6
	47.9–54.9	*51.6–65.6*	*53.0–66.8*	*50.1–64.3*	*39.4–50.0*	*30.5–45.3*
Medium	58.2	66.1	65.4	58.7	53.4	46.5
	55.7–60.8	*61.4–70.5*	*60.0–70.5*	*53.8–63.5*	*47.8–58.9*	*40.2–52.8*
High	58.7	63.8	67.5	59.1	56.6	46.4
	54.6–62.6	*56.1–70.8*	*58.9–75.2*	*51.5–66.4*	*49.1–63.7*	*36.5–56.6*
Residential location						
Major city	57.7	66.0	65.0	57.7	54.4	44.8
	55.3–60.2	*61.3–70.3*	*59.5–70.1*	*52.4–62.9*	*49.6–59.1*	*37.4–52.3*
Inner regional	53.1	64.2	57.6	61.4	48.3	37.5
	48.4–57.9	*55.7–71.9*	*50.7–64.2*	*52.0–70.0*	*40.7–55.9*	*29.5–46.1*
Outer regional	56.9	62.9	66.4	61.1	50.4	45.9
	53.1–60.6	*55.1–70.0*	*61.4–71.1*	*54.5–67.2*	*45.0–55.8*	*38.2–53.8*
Remote/Very remote	47.3	49.2	65.7	46.9	35.9	34.4
	39.8–54.8	*37.2–61.2*	*51.9–77.2*	*35.0–59.1*	*26.4–46.7*	*23.0–47.8*
Reason for last dental visit						
Check-up	55.5	64.6	65.8	58.1	50.4	43.5
	53.4–57.7	*59.6–69.3*	*61.9–69.5*	*54.3–61.9*	*46.5–54.4*	*37.9–49.2*
Dental problem	54.3	69.1	54.2	58.7	52.0	39.0
	50.1–58.4	*59.5–77.4*	*46.3–61.9*	*51.7–65.4*	*44.7–59.2*	*29.0–50.0*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

6.1.5 Eating or licking toothpaste

It is recommended that children do not eat or lick toothpaste and toothpaste packaging carries warnings against the ingestion of the product. Eating or licking toothpaste is not known to confer any caries preventive effects and is a risk factor for the development of dental fluorosis. Parents were asked: 'Have you noticed your child eating or licking toothpaste?' with response options 'Often', 'Sometimes' and 'Never'.

Although the majority of Queensland children were reported to never eat or lick toothpaste, and the percentage increased to a very high 95.1% of those aged 13–14 years, it is apparent that toothpaste consumption still occurs relatively frequently at younger ages (Table 6.6). While 57.7% of children aged 5–6 years never ate or licked toothpaste, this means that 42.3% of children at this age did so at least occasionally. There were no significant differences in eating or licking toothpaste by any of the variables in Table 6.6, although there was a relatively consistent trend for children residing in remote/very remote locations to do so less.

There was also a non-significant trend for Indigenous children to less frequently never eat or lick toothpaste. While the difference between Indigenous and non-Indigenous children was only 5.3% across all ages, differences within the reported two-year age groups were as large as 10.8% for children aged 13–14 years. Only among children age 9–10 years were Indigenous children found to more often report never eating or licking toothpaste.

Table 6.6: Percentage of children who never eat or lick toothpaste in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All children	**78.6**	**57.7**	**70.0**	**82.2**	**88.2**	**95.1**
	76.8–80.4	*53.9–61.5*	*66.3–73.5*	*79.5–84.6*	*85.6–90.5*	*92.6–96.7*
Sex						
Male	77.6	55.7	68.8	80.4	86.5	96.4
	75.1–79.9	*50.4–60.8*	*63.8–73.4*	*76.0–84.1*	*82.3–89.8*	*94.0–97.9*
Female	79.7	59.8	71.4	84.4	89.8	93.6
	77.4–81.9	*54.9–64.5*	*65.8–76.4*	*80.5–87.6*	*85.9–92.8*	*88.6–96.5*
Indigenous identity						
Non-Indigenous	79.0	58.3	70.8	81.8	88.6	95.8
	77.1–80.8	*54.3–62.2*	*66.7–74.6*	*78.9–84.4*	*85.9–90.9*	*93.6–97.2*
Indigenous	73.7	50.1	61.6	85.5	83.9	84.7
	66.3–80.0	*35.6–64.6*	*47.6–74.0*	*74.7–92.1*	*74.2–90.4*	*63.1–94.7*
Parent country of birth						
Australian born	77.9	59.3	69.2	81.0	87.7	93.4
	75.4–80.2	*54.0–64.4*	*64.7–73.4*	*76.7–84.6*	*84.7–90.2*	*89.6–95.9*
Overseas born	79.7	55.4	71.3	83.8	89.0	97.3
	77.2–81.9	*49.6–61.0*	*64.8–76.9*	*79.8–87.2*	*85.1–92.0*	*94.6–98.7*
Parental education						
School	78.7	56.9	72.3	77.5	87.6	94.0
	75.5–81.5	*48.6–64.9*	*65.8–78.0*	*71.3–82.7*	*82.3–91.4*	*88.6–97.0*
Vocational training	76.4	56.4	65.5	86.0	81.4	94.1
	72.6–79.9	*48.3–64.2*	*55.8–74.0*	*79.9–90.4*	*73.5–87.4*	*89.6–96.8*
Tertiary education	79.6	58.5	71.5	82.6	91.1	96.3
	77.3–81.7	*53.3–63.5*	*66.3–76.2*	*78.3–86.2*	*87.7–93.6*	*92.4–98.2*
Household income						
Low	77.0	51.8	68.9	78.6	87.6	95.2
	73.9–79.8	*44.9–58.6*	*62.1–74.9*	*73.7–82.9*	*82.6–91.3*	*89.2–98.0*
Medium	78.9	60.1	72.2	82.3	88.1	94.4
	76.4–81.1	*54.8–65.1*	*66.7–77.1*	*77.7–86.1*	*84.1–91.2*	*89.6–97.1*
High	81.4	61.5	73.1	85.2	90.5	96.3
	77.8–84.6	*52.9–69.4*	*64.8–80.1*	*79.1–89.8*	*84.4–94.3*	*91.5–98.5*
Residential location						
Major city	79.5	61.6	71.7	81.7	88.0	96.1
	77.3–81.5	*56.4–66.5*	*67.1–75.8*	*77.4–85.3*	*83.7–91.3*	*92.8–97.9*
Inner regional	76.6	53.6	60.3	85.2	87.4	94.5
	71.7–80.9	*42.9–64.0*	*49.4–70.3*	*77.6–90.6*	*79.9–92.4*	*87.2–97.7*
Outer regional	80.5	55.7	74.3	82.2	89.6	96.5
	77.6–83.2	*49.9–61.3*	*68.4–79.5*	*77.3–86.2*	*85.6–92.6*	*93.6–98.1*
Remote/Very remote	72.1	49.3	67.6	79.3	87.5	82.2
	65.0–78.2	*40.9–57.8*	*54.0–78.8*	*70.9–85.8*	*79.1–92.8*	*59.4–93.6*
Reason for last dental visit						
Check-up	81.2	61.7	69.4	83.0	88.8	95.2
	79.3–83.0	*57.0–66.2*	*64.9–73.5*	*80.1–85.7*	*86.0–91.1*	*92.8–96.8*
Dental problem	78.0	54.8	71.3	78.6	86.4	94.6
	74.8–81.0	*45.6–63.7*	*64.4–77.3*	*73.3–83.2*	*80.0–91.1*	*86.9–97.9*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

6.1.6 Parental assistance with child toothbrushing

Table 6.7 shows the percentages of parents who assisted their child with toothbrushing. Parents responded to the question: 'How do you usually assist your child to brush his/her teeth?' and could respond 'Applied toothpaste & brushed teeth', 'Only put toothpaste on brush', 'Watched and gave advice', 'Did not help brush' or 'Other'. Parents were categorised as those who helped their child in any way, or as those who did not help their children in any way with their toothbrushing.

Not surprisingly, the level of parental assistance with toothbrushing decreased for older children, reducing from 88.7% at 5–6 years to 14.6% at age 13–14 years. At age 9–10 years, more than 50% of parents provided some assistance or supervision of their child's toothbrushing.

There were only small and mostly non-significant differences across any of the sociodemographic or socioeconomic categories in Table 6.7. However, parents with tertiary education were more likely to provide assistance with toothbrushing, in comparison to parents with vocational training, for younger children. Differences were 6.5% for children aged 5–6 years and 14.8% for children aged 7–8 years. However, among older children, parents with tertiary education were slightly less likely to provide toothbrushing assistance than were parents with vocational training.

While there was little difference in parental assistance for boys and girls, it would seem that boys aged 11–12 years had significantly more parental assistance (34.2%) than their female counterparts (24.9%).

Table 6.7: Percentage of children whose parents help in some way with toothbrushing in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All children	**51.4**	**88.7**	**72.2**	**52.3**	**29.4**	**14.6**
	48.8–54.0	*86.1–90.9*	*68.7–75.5*	*49.0–55.6*	*26.1–32.9*	*12.3–17.3*
Sex						
Male	53.3	90.2	72.5	54.3	34.2	14.8
	50.3–56.3	*86.6–92.9*	*67.8–76.6*	*49.4–59.1*	*29.4–39.4*	*11.4–19.1*
Female	49.4	87.3	71.9	49.9	24.9	14.4
	46.2–52.6	*83.4–90.5*	*67.3–76.2*	*45.1–54.7*	*21.0–29.3*	*10.8–19.0*
Indigenous identity						
Non-Indigenous	51.5	89.1	72.4	52.8	28.7	14.8
	48.9–54.1	*86.6–91.2*	*68.8–75.8*	*49.4–56.2*	*25.4–32.3*	*12.4–17.6*
Indigenous	50.4	83.6	70.0	47.4	37.1	12.1
	43.7–57.0	*63.2–93.8*	*55.7–81.2*	*35.0–60.3*	*26.2–49.6*	*5.1–26.1*
Parent country of birth						
Australian born	50.7	88.8	73.1	49.2	27.2	13.2
	47.7–53.6	*85.4–91.4*	*68.5–77.4*	*44.7–53.7*	*22.9–31.9*	*10.3–16.8*
Overseas born	52.5	88.7	70.8	56.6	32.5	16.5
	49.1–55.9	*84.6–91.8*	*65.1–76.0*	*51.2–61.9*	*27.5–37.9*	*12.5–21.6*
Parental education						
School	49.4	89.1	69.7	56.1	31.3	12.0
	45.2–53.6	*83.2–93.1*	*60.9–77.2*	*49.9–62.2*	*25.4–38.0*	*7.6–18.4*
Vocational training	51.3	84.2	62.7	54.8	31.3	16.9
	46.8–55.7	*77.5–89.2*	*53.7–70.9*	*46.8–62.5*	*24.3–39.4*	*10.6–25.8*
Tertiary education	52.6	90.7	77.5	49.0	27.7	14.7
	49.5–55.6	*87.8–93.0*	*73.1–81.4*	*43.9–54.2*	*23.6–32.3*	*11.2–19.1*
Household income						
Low	51.4	88.3	72.9	53.7	34.0	13.6
	47.5–55.4	*83.5–91.9*	*66.1–78.8*	*47.9–59.4*	*28.6–40.0*	*9.2–19.7*
Medium	52.2	89.0	72.4	51.6	26.8	16.5
	49.1–55.4	*84.8–92.1*	*66.2–77.8*	*46.3–56.8*	*22.2–32.0*	*12.3–21.7*
High	50.8	91.1	73.0	52.6	27.0	11.9
	46.6–55.0	*86.4–94.3*	*66.5–78.7*	*44.1–61.0*	*20.9–34.1*	*7.1–19.3*
Residential location						
Major city	52.7	90.4	72.1	53.6	28.0	15.7
	49.0–56.3	*87.4–92.7*	*67.2–76.5*	*48.6–58.6*	*23.7–32.7*	*11.9–20.3*
Inner regional	48.1	86.6	72.6	42.1	30.1	14.5
	42.1–54.2	*78.3–92.0*	*63.2–80.4*	*34.1–50.7*	*22.4–39.1*	*9.6–21.3*
Outer regional	50.4	88.1	74.6	56.3	29.8	12.6
	45.6–55.3	*83.0–91.8*	*66.6–81.3*	*51.0–61.4*	*22.4–38.4*	*8.9–17.5*
Remote/Very remote	54.3	86.8	67.8	54.1	33.1	13.7
	46.9–61.5	*72.7–94.2*	*59.7–75.0*	*44.3–63.5*	*25.0–42.4*	*6.2–27.7*
Reason for last dental visit						
Check-up	48.2	88.5	73.5	53.2	29.0	14.1
	45.3–51.2	*85.0–91.3*	*69.0–77.6*	*49.4–57.0*	*25.7–32.6*	*11.5–17.2*
Dental problem	50.5	87.1	72.1	51.0	29.5	17.2
	46.5–54.5	*80.1–91.9*	*65.2–78.1*	*43.7–58.4*	*22.1–38.3*	*11.2–25.5*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

6.2 Patterns of other preventive practices

While brushing teeth with fluoride toothpaste is the most widely adopted oral health behaviour related to the application of fluoride to teeth, there are several other fluoride vehicles which may also be used. These include the use of fluoride tablets or drops, the use of fluoride-containing mouthrinse, and the application of fluoride varnishes and other fluoride treatments.

6.2.1 Fluoride tablets or drops

In the past, fluoride supplements (tablets or drops) have been recommended for children who did not have access to community water fluoridation. Usage of these products has varied, with some consumed as chewable tablets and others added to drinking water to mimic the effect which might be achieved by consuming fluoridated tap water. Although fluoride supplements have long been advocated as an alternative source of fluoride in areas without fluoridated tap water, problems with compliance, especially in young children, and the increased risk for dental fluorosis, led to recommendations that they should no longer be used (ARCPOH 2006).

Overall, between 11.9% and 20.3% of children in any age group had used fluoride drops or tablets at some time in their life (Table 6.8). Generally, children from older age groups were more likely to have had fluoride tablets or drops than were children from younger ages.

Non-Indigenous children were almost twice as likely to have used fluoride tablets or drops (17.2%) than were Indigenous children (9.0%). Differences by Indigenous identity were most pronounced for children aged 9–10 years (showing a 10.3% absolute difference) and for children aged 11–12 years (14.2% absolute difference).

There were also significant effects by socioeconomic status, with gradients in use of fluoride tablets and drops by parental education and household income. Across all age groups, children were most likely to have used fluoride supplements if their parents had some tertiary education, and were more likely to have used fluoride tablets or drops if their parents had some vocational training than if their parents had only school-level education. There were variations across the age groups in these differences, however.

There was also a gradient in use of fluoride tablets and drops across low (10.5%), medium (18.2%) and high income (23.3%) households. This gradient was relatively consistent across the two-year age groups.

Fluoride tablets or drops were more commonly used in major city areas than in other residential locations, and tended to be used least in remote and very remote areas. There was evidence of a gradient in use, increasing across remote/very remote, outer regional, inner regional and major city areas.

Children whose last dental visit was for a problem were less likely to have consumed fluoride tablets or drops than were children whose last visit was for a check-up, and this was evidenced across all child age groups.

Table 6.8: Percentage of children who have used fluoride tablets or drops at any time in their life in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All children	**16.5**	**11.9**	**16.9**	**15.3**	**20.3**	**18.4**
	14.9–18.4	*9.7–14.6*	*14.2–20.0*	*12.7–18.3*	*17.1–23.8*	*15.3–22.0*
Sex						
Male	17.5	11.2	18.6	17.5	20.1	20.1
	15.3–20.0	*8.3–15.0*	*14.6–23.3*	*14.0–21.7*	*16.3–24.6*	*15.4–25.7*
Female	15.5	12.6	15.1	12.5	20.4	16.7
	13.7–17.6	*9.6–16.4*	*11.4–19.6*	*9.6–16.2*	*16.7–24.7*	*12.4–22.1*
Indigenous identity						
Non-Indigenous	17.2	12.3	17.6	16.2	21.4	18.6
	15.4–19.1	*9.9–15.1*	*14.8–20.8*	*13.5–19.3*	*18.1–25.1*	*15.3–22.5*
Indigenous	9.0	7.1	10.1	5.9	7.2	15.7
	5.8–13.6	*2.5–18.7*	*3.9–24.0*	*2.3–14.3*	*2.9–17.0*	*7.1–31.1*
Parent country of birth						
Australian born	17.5	11.0	20.4	15.1	23.0	18.1
	15.5–19.6	*8.2–14.4*	*16.4–25.1*	*12.0–18.8*	*18.9–27.6*	*13.9–23.1*
Overseas born	15.3	13.4	11.8	15.5	16.3	18.9
	13.0–17.8	*9.6–18.2*	*8.5–16.1*	*11.8–20.2*	*12.8–20.7*	*14.6–24.2*
Parental education						
School	8.8	4.7	8.8	6.2	15.4	8.3
	7.0–10.9	*2.2–9.7*	*5.5–13.7*	*3.7–10.1*	*11.3–20.6*	*5.2–13.0*
Vocational training	15.2	5.8	19.0	14.8	15.9	21.7
	12.5–18.5	*3.2–10.3*	*13.0–26.9*	*10.1–21.2*	*11.1–22.2*	*14.2–31.8*
Tertiary education	21.5	17.4	21.3	19.3	24.6	25.5
	19.3–23.9	*14.2–21.2*	*17.9–25.2*	*15.5–23.6*	*20.3–29.5*	*20.5–31.2*
Household income						
Low	10.5	6.0	13.6	9.0	11.6	12.6
	8.6–12.9	*3.4–10.4*	*8.8–20.2*	*5.9–13.4*	*8.5–15.8*	*8.5–18.2*
Medium	18.2	12.7	16.8	16.9	25.0	19.9
	16.1–20.3	*9.7–16.4*	*12.8–21.9*	*13.3–21.3*	*20.4–30.3*	*15.1–25.8*
High	23.3	20.9	23.7	22.2	25.7	23.6
	20.0–27.0	*14.2–29.7*	*17.5–31.2*	*16.8–28.7*	*19.5–33.0*	*17.2–31.4*
Residential location						
Major city	19.7	15.9	20.0	18.2	23.5	20.9
	17.2–22.4	*12.3–20.4*	*16.5–24.0*	*14.2–23.2*	*19.1–28.6*	*16.0–26.8*
Inner regional	14.8	7.2	18.9	14.3	17.8	16.1
	10.9–19.7	*3.7–13.6*	*11.0–30.5*	*10.5–19.1*	*10.5–28.4*	*10.7–23.5*
Outer regional	13.3	9.6	11.3	13.2	16.0	15.7
	10.8–16.4	*6.1–14.8*	*7.0–17.7*	*8.7–19.6*	*11.1–22.4*	*10.9–22.0*
Remote/Very remote	10.3	3.6	9.7	6.0	18.6	16.9
	7.0–15.0	*1.0–12.3*	*3.9–22.3*	*3.1–11.6*	*10.4–31.0*	*8.1–31.9*
Reason for last dental visit						
Check-up	19.3	18.0	19.7	16.0	22.3	20.0
	17.4–21.3	*14.5–22.0*	*16.4–23.4*	*13.0–19.5*	*18.8–26.4*	*16.4–24.0*
Dental problem	12.1	5.1	12.7	13.7	14.6	12.0
	9.8–14.9	*2.2–11.3*	*8.0–19.6*	*9.6–19.1*	*10.4–20.2*	*7.1–19.3*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

6.2.2 Use of fluoride mouthrinse

Some mouthrinse products available for purchase in Australia contain fluoride but it is not recommended that children below the age of 6 years should use these products (ARCPOH 2006). Table 6.9 shows that the use of fluoride mouthrinse was relatively low for young children (12.1% at ages 5–6) but increased to almost 30% of children in the three oldest age groups studied (9–10, 11–12 and 13–14 years).

There were no significant differences in mouthrinse use across categories of sex, Indigenous identity, parents' country of birth, parental education, household income, residential location or reason for last dental visit.

Some non-significant differences within age groups warrant mentioning. For example, among the youngest (5–6) and oldest (13–14) age groups, a higher percentage of girls than boys had used fluoride mouthrinse. Also, non-Indigenous children aged 7–8 and 9–10 years were more likely to use fluoride mouthrinse than Indigenous children, with absolute percentage differences being 8.5% and 8.8% respectively.

Table 6.9: Percentage of children who have used fluoride mouthrinse at any time in their life in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All children	**23.8**	**12.1**	**21.1**	**28.3**	**28.2**	**29.1**
	22.5–25.1	*9.9–14.7*	*18.1–24.5*	*25.5–31.3*	*25.6–31.0*	*25.7–32.8*
Sex						
Male	22.3	9.7	19.5	28.1	28.8	25.2
	20.4–24.4	*7.0–13.5*	*15.7–24.0*	*24.5–32.0*	*24.7–33.4*	*20.5–30.5*
Female	25.3	14.5	22.9	28.5	27.6	33.3
	23.4–27.2	*11.0–18.8*	*18.5–27.9*	*24.4–32.9*	*24.1–31.4*	*28.1–38.9*
Indigenous identity						
Non-Indigenous	24.0	11.9	21.9	29.1	28.4	29.2
	22.7–25.5	*9.5–14.7*	*18.5–25.6*	*26.1–32.2*	*25.6–31.4*	*25.7–33.0*
Indigenous	20.3	15.7	13.4	20.3	25.7	27.5
	16.4–24.9	*8.6–27.1*	*7.3–23.2*	*13.0–30.3*	*17.9–35.4*	*16.0–43.1*
Parent country of birth						
Australian born	23.3	12.1	23.0	25.6	27.4	29.0
	21.6–25.1	*9.4–15.4*	*19.1–27.4*	*22.2–29.3*	*24.0–31.1*	*24.3–34.2*
Overseas born	24.4	12.2	18.4	32.0	29.3	29.2
	22.1–26.8	*8.8–16.7*	*14.1–23.6*	*27.1–37.4*	*25.1–34.0*	*23.1–36.2*
Parental education						
School	24.6	14.9	23.3	22.5	31.4	29.1
	21.9–27.7	*10.7–20.4*	*17.2–30.7*	*17.8–28.0*	*26.1–37.2*	*22.5–36.7*
Vocational training	25.2	15.4	19.0	35.7	27.0	28.8
	22.4–28.2	*10.1–22.7*	*13.0–26.9*	*29.0–43.0*	*20.9–34.1*	*21.2–37.7*
Tertiary education	23.2	9.5	21.7	28.6	27.7	29.4
	21.3–25.2	*7.0–12.8*	*17.5–26.5*	*24.7–32.9*	*23.9–31.9*	*24.0–35.5*
Household income						
Low	24.0	13.3	18.8	28.5	29.6	28.4
	21.8–26.4	*9.5–18.4*	*14.3–24.3*	*23.9–33.6*	*25.0–34.6*	*22.1–35.8*
Medium	25.2	12.5	26.3	29.4	27.2	32.5
	23.1–27.5	*9.4–16.5*	*21.2–32.1*	*24.5–34.7*	*22.7–32.3*	*26.8–38.8*
High	21.9	10.8	18.0	27.5	28.3	24.8
	19.0–25.2	*6.6–17.0*	*13.3–23.8*	*21.4–34.6*	*22.5–34.8*	*17.7–33.6*
Residential location						
Major city	23.2	11.1	22.4	26.0	28.4	29.0
	21.3–25.3	*8.3–14.6*	*18.0–27.5*	*21.7–30.9*	*24.7–32.4*	*24.2–34.3*
Inner regional	24.5	10.0	21.4	33.8	26.1	31.3
	21.8–27.3	*5.5–17.5*	*14.4–30.6*	*26.9–41.5*	*20.1–33.1*	*23.1–40.8*
Outer regional	23.7	16.4	18.2	29.9	27.4	25.1
	21.5–26.1	*12.8–20.8*	*13.9–23.4*	*25.1–35.1*	*22.1–33.4*	*19.3–32.0*
Remote/Very remote	25.3	14.5	21.7	27.7	27.8	40.9
	19.6–32.0	*6.4–29.7*	*13.1–33.7*	*20.1–36.8*	*19.7–37.7*	*28.2–54.9*
Reason for last dental visit						
Check-up	24.0	13.8	20.8	26.6	27.9	27.3
	22.3–25.7	*10.4–18.0*	*17.4–24.8*	*23.1–30.4*	*24.8–31.2*	*23.4–31.6*
Dental problem	29.1	11.4	25.2	35.3	31.4	36.8
	25.9–32.5	*7.0–18.0*	*18.5–33.3*	*29.2–41.9*	*25.3–38.2*	*26.7–48.2*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

6.2.3 Fluoride varnishes, gels or other applied treatments

Parents were asked whether or not their children had ever had fluoride applied to their child's teeth by a dentist or oral health therapist, and also whether a dentist or oral health therapist had ever prescribed a fluoride treatment for their child to use at home. Fluoride varnishes, for example, are applied by dental professionals directly to dried teeth and are believed to be efficacious in preventing dental caries in both young and older children (ARCPOH 2006). Fluoride gels and foams are contra-indicated for young children but there is evidence of their effectiveness in the permanent dentition of older children.

Approximately one-quarter of children had received a professionally applied fluoride treatment, and the percentage was higher among increasingly older age groups, ranging from 15.3% of children aged 5–6 years to 35.3% of those aged 13–14 years (Table 6.10). This increase across age groups reflects to a large degree the greater number of life years available for the fluoride application to occur (e.g. children aged 13–14 years are approximately 2.5 times older and approximately 2.5 times more likely to have a topical fluoride application than children aged 5–6 years).

There is evidence of a difference in the application of fluoride treatments across children of differing Indigenous identity. Non-Indigenous children were more likely to have had professionally applied fluoride treatments, although these differences only reached significance for children aged 13–14 years.

There were large gradients in the receipt of professionally applied fluoride treatments across socioeconomic groups. Increasingly higher parental education and high household income were both associated with increased percentages of children having received a professionally applied fluoride treatment. Also, children from major cities were more likely to have received a professionally applied fluoride treatment than children in other residential locations.

Children who last visited the dentist for a check-up were more likely to have had a professionally applied fluoride treatment than children who last visited the dentist for a dental problem.

In contrast to professionally applied fluoride applications, very few children (2.7%) had ever been prescribed a fluoride treatment to use at home. Because of the low numbers of children, there were few statistically significant associations evident in Table 6.11. It is interesting, however, that there are signs of a trend, once again, across parental education and household income categories.

Table 6.10: Percentage of children who have had fluoride applied to their teeth at a dentist at any time in their life in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All children	**26.5**	**15.3**	**21.9**	**27.9**	**31.9**	**35.3**
	24.1–29.0	*12.8–18.3*	*18.5–25.8*	*24.3–31.8*	*28.1–36.0*	*30.6–40.2*
Sex						
Male	27.0	14.0	23.3	28.9	34.1	34.6
	24.1–30.1	*10.8–17.9*	*18.8–28.5*	*24.3–33.9*	*28.8–39.9*	*28.0–41.7*
Female	26.0	16.6	20.3	26.8	29.9	36.0
	23.4–28.7	*13.1–20.9*	*15.8–25.7*	*22.4–31.8*	*25.2–35.0*	*30.2–42.3*
Indigenous identity						
Non-Indigenous	27.1	16.0	21.2	28.5	32.9	36.7
	24.6–29.7	*13.3–19.1*	*17.5–25.4*	*24.8–32.6*	*28.9–37.1*	*31.7–42.0*
Indigenous	19.3	5.9	29.7	22.0	20.6	15.3
	14.4–25.5	*2.0–16.2*	*17.7–45.2*	*13.5–33.9*	*12.6–31.9*	*7.4–29.1*
Parent country of birth						
Australian born	26.9	15.0	22.8	29.7	30.8	36.4
	24.2–29.7	*11.9–18.7*	*18.8–27.3*	*25.4–34.4*	*26.8–35.1*	*30.3–43.0*
Overseas born	25.9	15.7	20.6	25.5	33.6	33.7
	23.0–29.1	*12.0–20.3*	*16.1–26.0*	*20.8–30.8*	*27.6–40.2*	*27.0–41.1*
Parental education						
School	15.2	5.8	9.4	16.1	16.7	25.4
	12.8–18.0	*3.4–9.8*	*6.2–14.1*	*11.9–21.4*	*12.5–22.1*	*19.0–33.0*
Vocational training	23.5	13.9	17.5	21.8	30.3	35.8
	20.1–27.3	*9.0–21.0*	*11.8–25.3*	*16.2–28.8*	*22.8–38.9*	*27.0–45.8*
Tertiary education	33.9	20.1	30.6	37.1	39.9	43.1
	30.9–37.1	*16.3–24.5*	*25.4–36.5*	*31.8–42.7*	*35.0–44.9*	*36.2–50.3*
Household income						
Low	16.2	7.5	12.1	17.3	19.5	23.6
	14.0–18.7	*4.9–11.3*	*8.5–16.8*	*13.1–22.4*	*14.9–25.2*	*17.2–31.4*
Medium	27.7	16.1	22.9	30.3	32.8	38.0
	24.6–31.0	*12.2–20.9*	*17.7–29.0*	*25.6–35.5*	*27.5–38.6*	*31.8–44.6*
High	42.5	28.9	34.8	47.0	50.0	51.5
	37.5–47.6	*21.5–37.7*	*26.1–44.6*	*38.5–55.6*	*42.6–57.5*	*41.1–61.7*
Residential location						
Major city	32.7	21.1	27.5	33.2	40.3	42.2
	29.0–36.5	*17.1–25.7*	*22.1–33.6*	*27.5–39.5*	*34.8–46.1*	*35.9–48.7*
Inner regional	22.3	12.3	18.1	25.5	26.5	28.5
	18.4–26.8	*7.5–19.5*	*12.4–25.8*	*18.9–33.3*	*19.8–34.5*	*18.5–41.2*
Outer regional	19.2	6.3	14.6	19.3	22.1	30.7
	16.5–22.1	*4.1–9.8*	*11.3–18.8*	*14.3–25.6*	*16.0–29.6*	*24.3–37.8*
Remote/Very remote	18.5	8.5	13.6	26.2	23.3	24.1
	14.5–23.4	*3.2–20.6*	*6.8–25.1*	*19.1–34.7*	*16.2–32.4*	*13.6–39.0*
Reason for last dental visit						
Check-up	31.3	24.2	25.9	30.8	35.0	37.3
	28.5–34.2	*20.0–29.0*	*21.4–30.9*	*26.6–35.2*	*30.6–39.7*	*31.9–43.1*
Dental problem	21.3	15.9	17.6	21.5	23.6	26.9
	18.2–24.7	*9.7–24.8*	*12.1–24.8*	*15.9–28.3*	*17.9–30.5*	*18.8–36.8*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

Table 6.11: Percentage of children who have been prescribed a fluoride treatment to use at home at any time in their life in the Queensland child population

		Population: children aged 5–14 years				
Age (years)	**All ages**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
All children	**2.7**	**1.4**	**1.9**	**3.8**	**3.2**	**3.2**
	2.3–3.3	*0.8–2.6*	*1.1–3.3*	*2.7–5.2*	*2.2–4.8*	*2.1–4.9*
Sex						
Male	2.7	1.2	2.0	4.4	3.7	2.1
	2.1–3.5	*0.5–2.8*	*0.9–4.2*	*2.8–6.7*	*2.1–6.6*	*1.0–4.5*
Female	2.7	1.6	1.8	3.1	2.8	4.3
	2.1–3.6	*0.7–3.8*	*0.8–4.2*	*1.8–5.2*	*1.6–5.1*	*2.6–7.3*
Indigenous identity						
Non-Indigenous	2.6	1.2	2.1	3.4	3.2	3.4
	2.2–3.2	*0.6–2.4*	*1.2–3.6*	*2.4–4.8*	*2.0–5.0*	*2.2–5.2*
Indigenous	3.6	4.5	0.1	8.2	4.0	0.5
	1.6–7.7	*1.9–10.4*	*0.0–1.0*	*2.9–21.4*	*1.1–13.3*	*0.1–3.4*
Parent country of birth						
Australian born	2.9	0.9	2.1	3.9	4.6	2.8
	2.2–3.7	*0.3–2.6*	*1.0–4.5*	*2.5–6.2*	*3.1–6.9*	*1.6–5.1*
Overseas born	2.5	2.3	1.6	3.6	1.2	3.6
	1.9–3.4	*1.1–4.6*	*0.7–3.6*	*2.1–6.1*	*0.5–3.1*	*1.9–6.9*
Parental education						
School	2.2	0.0	1.1	3.6	2.6	3.4
	1.5–3.3	—	*0.3–3.5*	*1.8–7.0*	*1.3–5.2*	*1.7–6.8*
Vocational training	2.4	0.1	0.9	4.5	4.1	2.7
	1.6–3.7	*0.0–0.4*	*0.2–4.7*	*2.4–8.3*	*2.0–8.5*	*0.9–7.7*
Tertiary education	3.2	2.5	2.9	3.6	3.5	3.4
	2.4–4.2	*1.3–4.7*	*1.6–5.2*	*2.1–6.2*	*1.9–6.2*	*1.8–6.6*
Household income						
Low	3.1	0.6	1.9	5.6	3.3	3.8
	2.3–4.2	*0.1–3.0*	*0.6–6.0*	*3.5–8.7*	*1.9–5.9*	*1.9–7.3*
Medium	2.8	2.1	2.3	4.3	2.2	3.4
	2.1–3.8	*1.0–4.5*	*1.2–4.3*	*2.7–6.9*	*0.8–5.7*	*1.7–6.7*
High	1.9	1.0	1.7	0.1	4.8	1.6
	1.2–3.1	*0.1–6.4*	*0.6–5.1*	*0.0–0.6*	*2.4–9.3*	*0.5–4.5*
Residential location						
Major city	2.3	1.4	2.0	2.7	3.1	2.5
	1.7–3.0	*0.6–3.1*	*1.0–3.7*	*1.6–4.8*	*1.5–6.0*	*1.1–5.3*
Inner regional	3.5	2.5	1.7	6.3	3.2	4.1
	2.2–5.7	*0.8–7.5*	*0.2–11.6*	*3.3–11.6*	*1.5–6.7*	*1.7–9.4*
Outer regional	2.9	0.2	1.1	4.8	4.2	3.4
	2.1–3.8	*0.1–0.6*	*0.5–2.7*	*2.9–7.9*	*2.1–8.4*	*1.7–6.5*
Remote/Very remote	2.6	2.3	3.0	2.3	2.4	3.3
	1.4–4.8	*0.8–6.6*	*0.4–18.9*	*0.6–8.4*	*0.5–9.8*	*1.1–9.7*
Reason for last dental visit						
Check-up	2.5	1.5	1.7	3.0	3.4	2.7
	2.0–3.2	*0.7–3.1*	*0.9–3.4*	*1.8–4.8*	*2.1–5.5*	*1.6–4.5*
Dental problem	4.4	4.4	3.2	6.4	2.4	5.3
	3.2–6.0	*1.5–11.8*	*1.2–8.2*	*3.9–10.3*	*1.0–5.4*	*2.2–12.2*

Row 1: Per cent of children.
Row 2: 95%CI: confidence interval for estimated per cent.
Columns are arranged by age at time of Survey.

6.3 Summary of findings

A summary of the findings related to toothbrushing is shown in Table 6.12 while a summary of findings related to other fluoride exposures (mouthrinse, fluoride tablets and drops, fluoride treatments applied either by a professional or at home) is shown in Table 6.13.

Age-group-related differences were evident for use of standard fluoride toothpaste, amount of toothpaste used, ingestion of toothpaste and assistance by parents when brushing, but not for the age a child commenced brushing with toothpaste or number of times a day a child brushed. These differences were in the direction expected. The use of standard fluoridated toothpaste increased from about one in four children aged 5–6 years to one in two aged 7–8 years, and increased to almost all children by age 13–14 years. The unexpected results was in that the increase was graduated, while based on the guidelines which recommend the use of standard fluoridated toothpaste from the age of 6, the major increase should have been seen between the age groups 5–6 years and 7–8 years.

Use of a pea-sized amount of toothpaste was more frequently adhered to among the younger age groups, with a markedly lower percentage of children aged 11–12 and 13–14 years using the desired amount. Older age groups had a markedly higher percentage of children not eating or licking the toothpaste, and a markedly lower percentage receiving help from their parents when brushing. For both of these indicators, there was a large change between the children aged 5–6 and 7–8 years, followed by a more graduated change across older age groups.

Indigenous children showed a markedly lower percentage than non-Indigenous children who commenced brushing with toothpaste early, aged less than 18 months, and a markedly higher percentage who commenced late, at age 30 months or older. There was a lower likelihood that Indigenous children would brush at least two times a day than non-Indigenous children, and a much lower likelihood they would use the recommended pea-sized amount of toothpaste when brushing.

Parental highest level of education showed an association with early toothbrushing, brushing at least twice per day and using a pea-sized amount of toothpaste. Children of parents with higher educational levels were more likely to adhere to the recommendations of toothpaste use, with a higher percentage brushing at least twice per day and a lower percentage using a pea-sized amount of toothpaste. However, children of parents with a higher level of education were also more likely to have commenced brushing with toothpaste early, before the age of 18 months. A slightly lower percentage of children of parents with a higher-level education commenced toothbrushing with toothpaste late, at age 30 months or older.

A similar pattern was seen across household income groups, but with weaker indication of an association for amount of toothpaste used, and a stronger indication of association for late commencement of toothbrushing with toothpaste.

Parental country of birth and reason for the last dental visit showed only a modest influence in some Tables on aspects of toothbrushing activity. Across residential location groups there was one marked difference between the reference group of children residing in major cities and those in remote/very remote locations. Sex of the child did not show association in any of the seven Tables pertaining to toothbrushing activities.

The differences across age groups indicated that older children were more likely to have used fluoride mouthrinse or received a professionally applied fluoride treatment.

Children of parents with higher education and from households with higher income had a higher percentage of use of fluoride tablets or drops or had received professional fluoride treatments than children of parents with a low education level and from a low income household.

Professional fluoride treatment was more frequently received by children residing outside of major city locations, and less frequently by children whose last dental visit was for a dental problem.

There were no associations evident across population groups by sex or parents' country of birth, and only small differences across groups by Indigenous identity.

Table 6.12: Summary of findings related to toothbrushing in the Queensland child population aged 5–14 years

	<18mths brush	≥30mths brush	2+/day brush	Standard fluoride	Pea-size amount	Don't eat paste	Help brush
Age							
5–6 years	Ref	Ref	Ref	Ref	Ref	Ref	Ref
7–8 years				↑↑		↑↑	↓↓
9–10 years				↑↑		↑↑	↓↓
11–12 years				↑↑	↓↓	↑↑	↓↓
13–14 years				↑↑	↓↓	↑↑	↓↓
Sex							
Male	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Female							
Indigenous identity							
Non-Indigenous	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Indigenous	↓↓	↑↑	↓		↓↓		
Parent country of birth							
Australian born	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Overseas born	↓	↑		↓			
Parental education							
School	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Vocational training	↑↑	↓			↓↓		
Tertiary education	↑↑	↓	↑↑		↓↓		
Household income							
Low	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Medium	↑	↓	↑		↓		
High	↑↑	↓↓	↑↑		↓		
Residential location							
Major city	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Inner regional							
Outer regional							
Remote/Very remote					↓↓		
Reason for last dental visit							
Check-up	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Dental problem		↑	↓				

Ref = Reference group.
Symbols: ↓↓ Markedly lower; ↓ Lower; Not sig. different; ↑ Higher; ↑↑ Markedly higher.

Table 6.13: Summary of findings related to other fluoride exposures in the Queensland child population aged 5–14 years

	Tablets/drops	Fluoride mouthrinse	Professional fluoride treatment	Home fluoride treatment
Age				
5–6 years	Ref	Ref	Ref	Ref
7–8 years		↑	↑	
9–10 years		↑↑	↑↑	
11–12 years	↑	↑↑	↑↑	
13–14 years	↑	↑↑	↑↑	
Sex				
Male	Ref	Ref	Ref	Ref
Female				
Indigenous identity				
Non-Indigenous	Ref	Ref	Ref	Ref
Indigenous	↓		↓	
Parent country of birth				
Australian born	Ref	Ref	Ref	Ref
Overseas born				
Parental education				
School	Ref	Ref	Ref	Ref
Vocational training	↑		↑	
Tertiary education	↑↑		↑↑	
Household income				
Low	Ref	Ref	Ref	Ref
Medium	↑		↑↑	
High	↑↑	↓	↑↑	
Residential location				
Major city	Ref	Ref	Ref	Ref
Inner regional			↓↓	
Outer regional	↓		↓↓	
Remote/Very remote	↓		↓↓	
Reason for last dental visit				
Check-up	Ref	Ref	Ref	Ref
Dental problem	↓	↑	↓↓	

Ref = Reference group.
Symbols: ↓↓ Markedly lower; ↓ Lower; Not sig. different; ↑ Higher; ↑↑ Markedly higher.

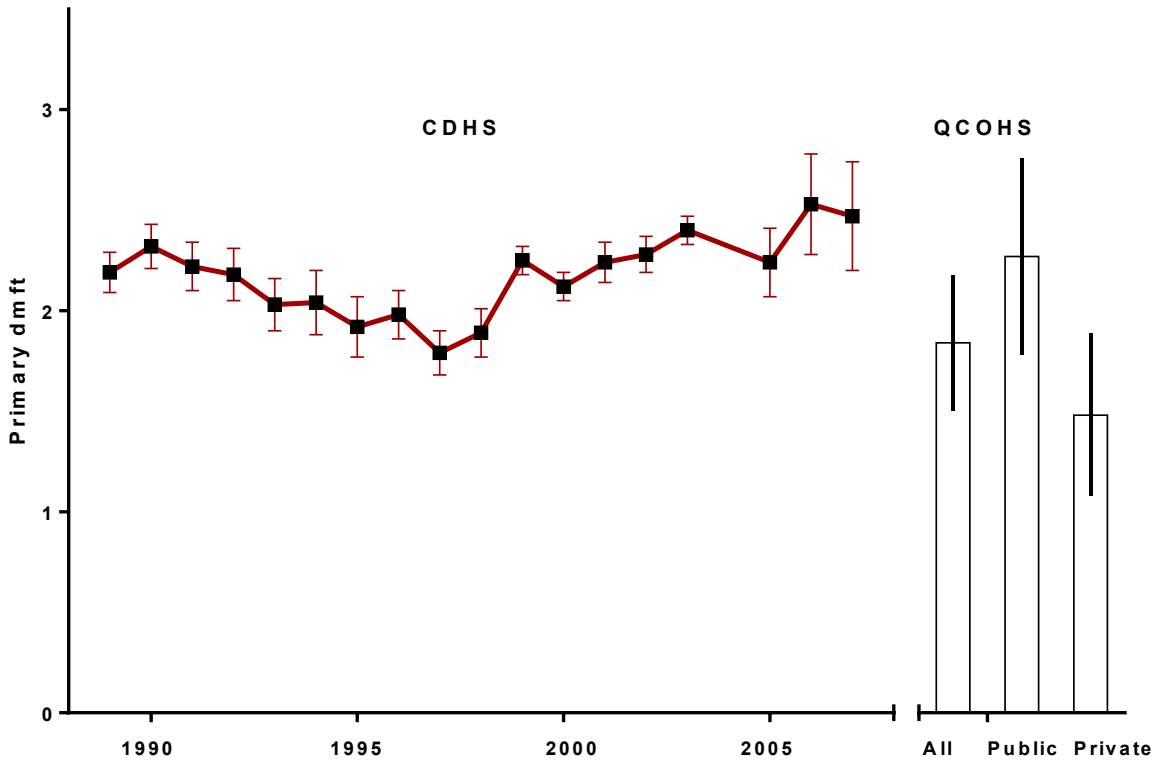
7. Trends in child oral health in Queensland

By Loc Do, Diep Ha, A John Spencer, Jason Armfield and Kaye Roberts-Thomson

7.1 Trends in oral health status

This chapter presents an analysis of trends between the current Survey and several existing surveys of child oral health in Queensland and Australia. The available surveys are a series of Child Dental Health Surveys (CDHS) across time. The CDHS series collects administrative data on the oral health status of children attending school dental services in Australian states and Territories. Therefore, those surveys covered just more than half of the child population in Queensland. There has been no such population-based study of child oral health in Queensland similar to QCOHS. This difference should be taken into account in interpreting results of this analysis. The CDHS data have been presented for age groups 5–6 years and 12 years. The presented data had been collected in Queensland for the CDHS series from 1989 to 2007.

QCOHS data of caries experience are presented for all children and separately for children who attended the public dental services or private dental services at their last dental visit.

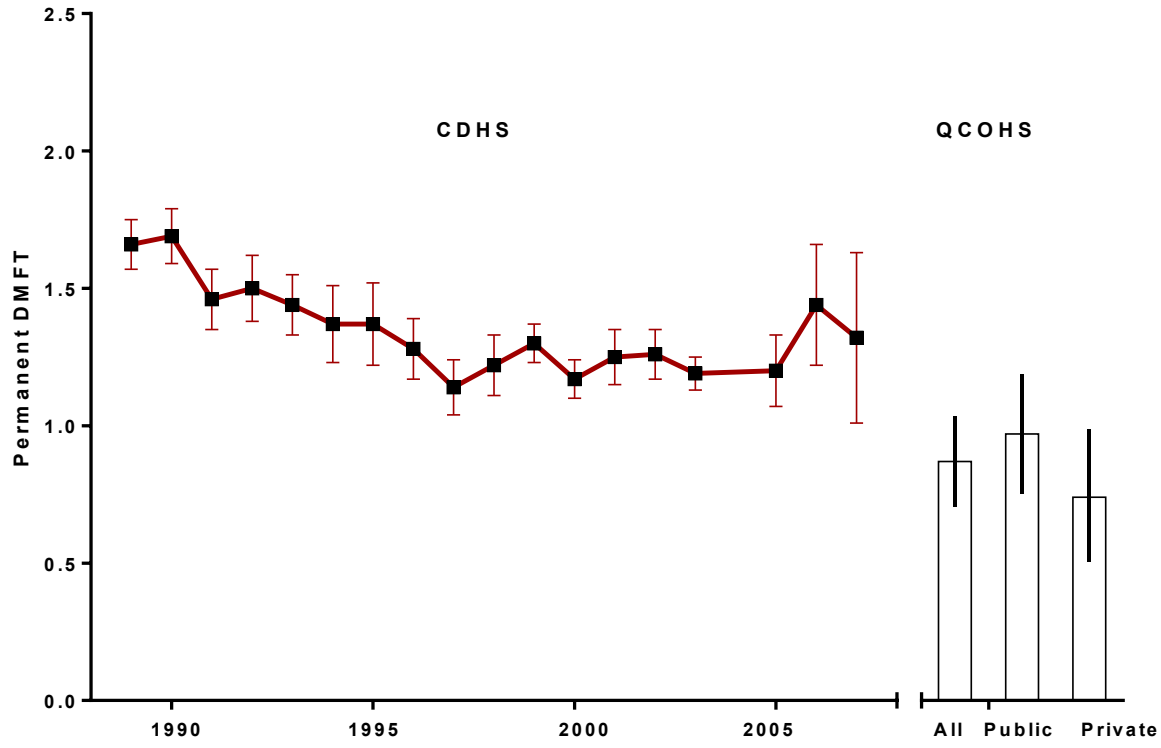


(Source: CDHS 2010)

Figure 7.1:Time trend of primary dental caries experience among children aged 5–6 years in the Child Dental Health Survey in Queensland as compared with QCOHS

The experience of dental caries in children aged 5–6 years attending school dental services in Queensland, captured in the CDHS series, varied over the last two decades (Mejia et al. 2012). On average, children aged 5–6 years attending school dental services in Queensland had over two primary teeth affected by dental caries experience. This trend fluctuated over the last two decades with the lowest level of disease experience observed in the mid-1990s.

The children aged 5–6 years who were examined in QCOHS had an average mean number of primary teeth with dental caries experience slightly lower than that reported in the 2007 CDHS. However, QCOHS children who last visited a public dental service had a similar mean number of primary teeth with dental caries experience. Children who last visited a private dental service had a significantly lower mean dmft score than children in the CDHS series during the 2000s.



(Source: CDHS 2010)

Figure 7.2: Time trend of permanent dental caries experience among 12 year old children in the Child Dental Health Survey as compared with QCOHS

There was a declining trend of dental caries in the permanent dentition among Queensland children aged 12 years who visited school dental services as captured by the CDHS series from 1989 to 2007. Figure 7.2 shows that the declining trend had levelled off during the 2000s. There was a small increase in the mean number of permanent teeth with dental caries experience in Queensland children attending school dental services in 2006. However, the difference was not statistically significant.

QCOHS participants aged 12 years recorded a lower average number of permanent teeth with dental caries experience than that reported in the CDHS series. However, the difference was not statistically significant. Children examined in QCOHS whose last visit was to a public dental service had similar mean dental caries experience in the permanent dentition with that reported in the recent CDHS series. Those children whose last dental visit was to a private provider had a lower mean DMFT score than children in the CDHS series. However, the difference was not statistically significant.

Overall, the level of oral health status observed among QCOHS study participants who last attended school dental services was comparable to that reported in the CDHS time series. This is another indication that the QCOHS sample was representative of the school dental service child population in Queensland, but has the additional participation of children who visit private clinics.

7.2 Trends in use of dental services

Evaluation of the time trend in the patterns of use of dental services in Queensland children was conducted using data from the National Dental Telephone Interview Surveys (NDTIS), which were conducted periodically across 1994 to 2010 (Harford and Luzzi 2013). The NDTIS is a series of telephone surveys conducted by ARCPOH. The NDTIS employs a multi-staged, stratified random sampling selection process. The responses were weighted to adjust for the sampling procedures and different response rates. Children were also randomly selected from households included in the interviews. Therefore, the child sample in NDTIS would reflect the population estimates.

Two patterns of dental service use were analysed among Queensland children aged 5–14 years. The first pattern was the proportion of children whose last dental visit was in the previous 12 months and the second pattern was the per cent of children whose last dental visit was for a check-up. Similar questions were asked in the QCOHS main questionnaire. Data were similarly managed and analysed.

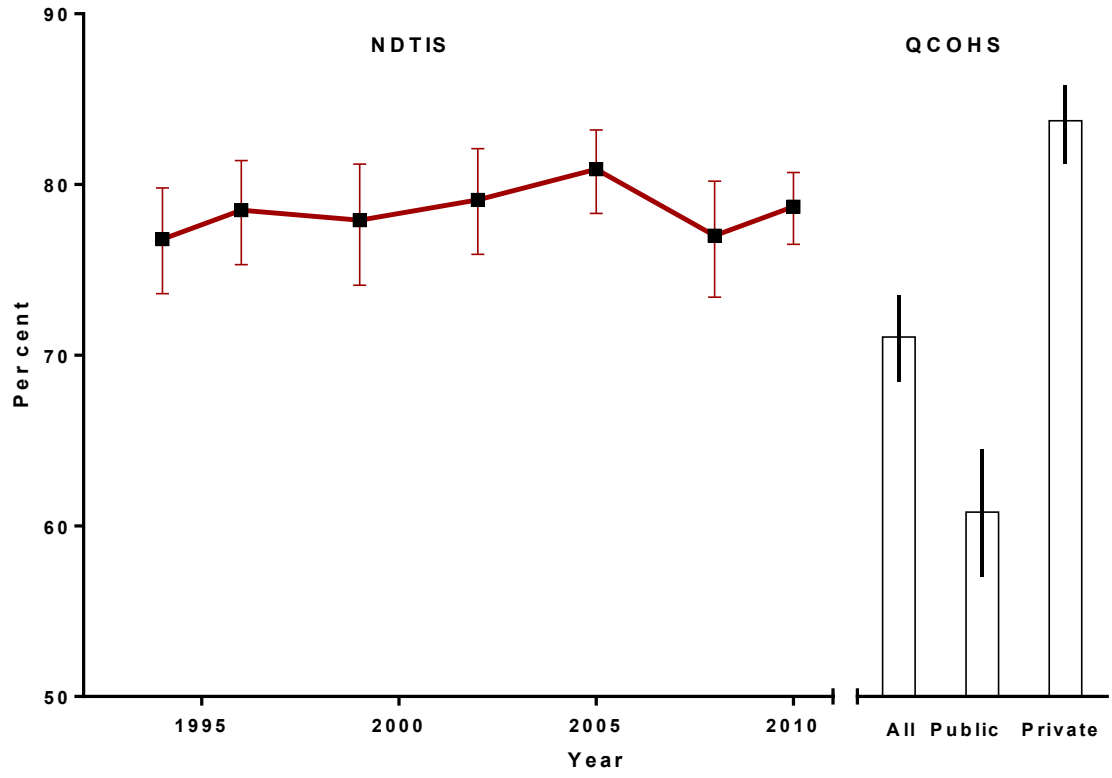


Figure 7.3: Time trend of per cent of children visiting in the last 12 months in Queensland 1994–2010 as compared with QCOHS

The majority of Queensland children had their last dental visit in the previous 12 months during the 1994 and 2010 (Figure 7.3). There was a declining trend of the proportion of children who had had a dental visit in the previous 12 months. However, the trend was not statistically significant.

The proportion of QCOHS children aged 5–14 years whose last dental visit was in the previous 12 months was lower than that reported by the NDTIS survey conducted in 2010, but was not statistically significant. This proportion was significantly lower than that of the previous NDTIS

surveys. Just over 60% of children whose last dental visit was to a public dental service attended in the previous 12 months, which was significantly lower than the proportion reported in the NDTIS series. In contrast, the proportion of QCOHS children visiting in the previous 12 months who last visited a private dental provider was similar to that of the NDTIS series.

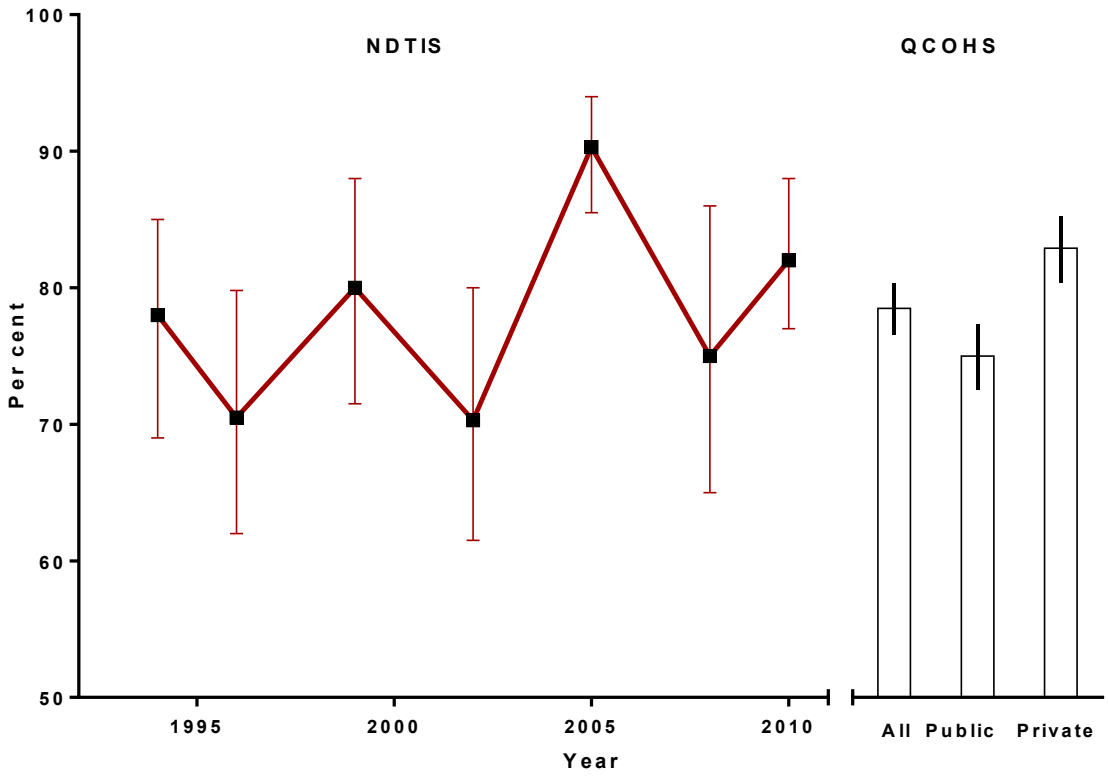


Figure 7.4: Time trend of per cent of children visiting for a check-up at their last dental visit in Queensland 1994–2010 as compared with QCOHS

During the period between 1994 and 2010, about two-thirds of Queensland children aged 5–14 years had their last dental visit for a check-up (Figure 7.4). There was some fluctuation in the estimates across the period due to low numbers of child interviews. This proportion slightly increased in more recent years. However, the trend was not significant.

The majority of children of the same age group in QCOHS reportedly had their last dental visit for a check-up. The combined figure for all QCOHS children was similar to that reported in the NDTIS series. The figure for children whose last dental visit was to a public dental service was lower. However, this proportion was still comparable to that reported in the NDTIS series. Children whose last dental visit was to a private dental provider were more likely to visit for a check-up than children who visited a public dental service.

Overall, the patterns of dental service use measured by the proportion of children whose last visit was in the previous 12 months and the proportion of children whose last visit was for a check-up, were similar to that reported in the NDTIS series.

7.3 Trends in patterns of oral health behaviours

The evaluation of trends in patterns of oral health behaviours was conducted using data from two earlier major studies among children attending school dental services. These were the Child Fluoride Study Mark 1 1991–92 (CFS I) and the Child Fluoride Study Mark 2, 2002–04 (CFS II). These studies collected data on oral health practices using parental questionnaires. Only children from Queensland were included in these analyses. Data were weighted to represent the populations of children attending school dental services at each time.

Similar questions were asked in the QCOHS parental questionnaire. QCOHS data included all children, of whom just over half attended school dental services at the last dental visit.

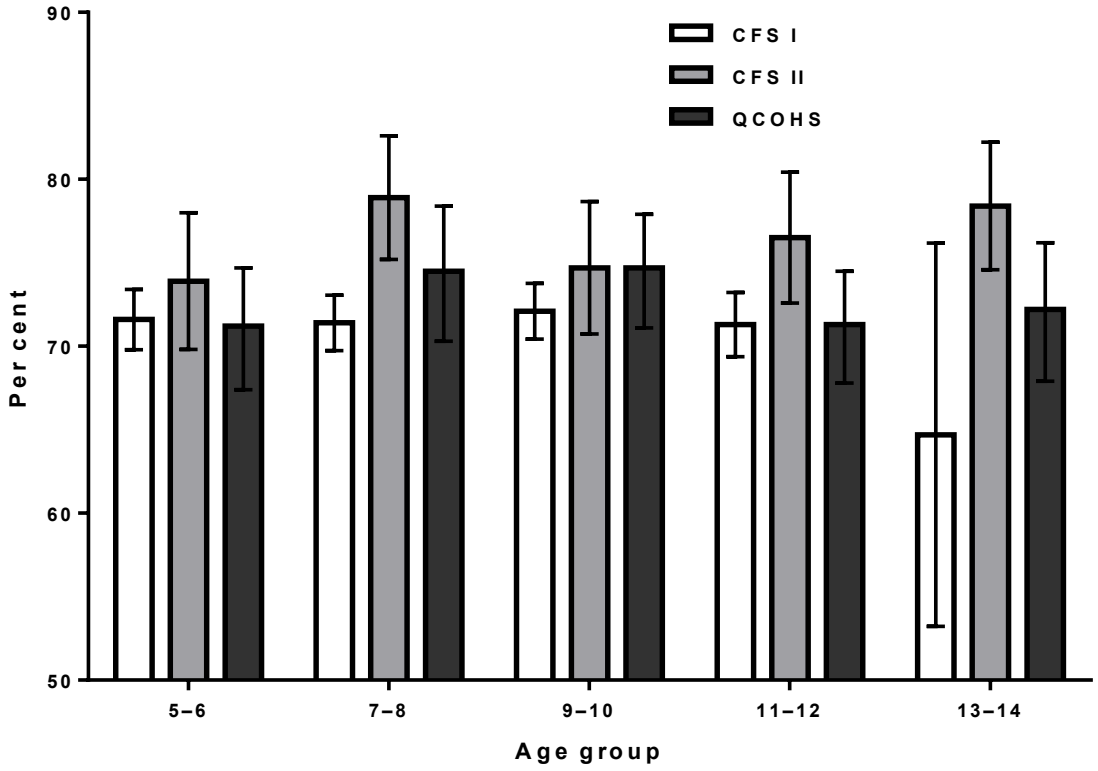


Figure 7.5: Trend in per cent of children who reportedly brushed their teeth at least twice a day

Brushing at least twice a day is recommended for all age groups in order to maintain good oral health. The trend in the proportion of children who brushed at least twice a day was evaluated using data from all three studies.

Over 70% of children in the three studies reportedly brushed at least twice a day (Figure 7.5). There were some fluctuations over time and across age groups. However, these fluctuations were not statistically significant.

Standard fluoride toothpaste is recommended for children over the age of 6 years and for younger children who are at risk of having dental caries (ARCPOH 2006). Low concentration fluoride toothpaste came to the Australian market in the early 1990s and is recommended for children aged younger than 6 years.

Trends in the use of standard fluoride toothpaste was evaluated using only CFS II and QCOHS data as study participants in CFS I had only standard fluoride toothpaste available to them.

There was an increasing trend of use of standard fluoride toothpaste across older aged children (Figure 7.6). This trend across age was consistent between the two studies. However, there were significantly fewer children aged 5–6 years and 7–8 years in the recent QCOHS study who reportedly used standard fluoride toothpaste compared with children of the same age in CFS II. The difference remained for children aged 9–10 years; however, the difference was not statistically significant. The two studies had a similar proportion of children aged 11 years or older who reportedly brushed with standard toothpaste.

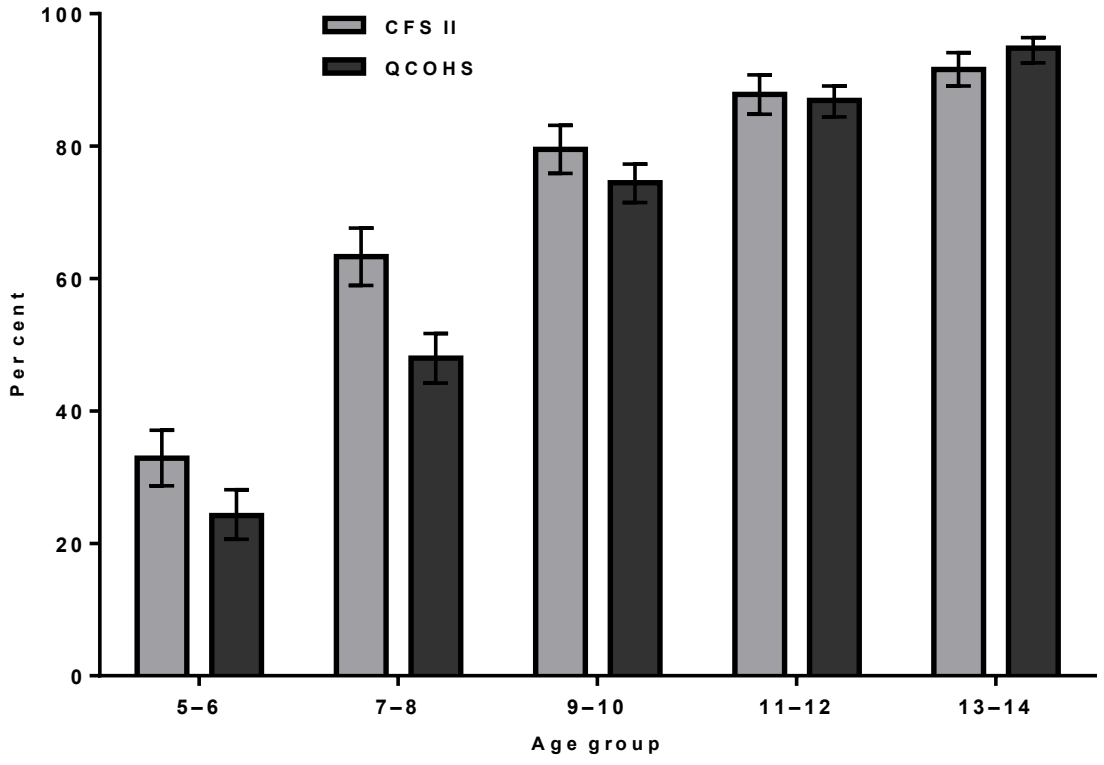


Figure 7.6: Trend in per cent of children who reportedly used standard fluoride toothpaste

7.4 Summary of trends

This chapter provides a comparison of several indicators collected in QCOHS with similar indicators collected in other existing studies in Australia. The indicators offer a snapshot of recent changes in child oral health status, dental care use and oral health practices.

Oral health status of children in key age groups (5–6 years and 12 years) was measured as averaged number of teeth affected by dental caries experience. This indicator is one of the main key performance indicators in monitoring oral health of the population. The oral health status of Queensland children attending school dental services collected by the CDHS series and QCOHS has remained relatively stable over the last two decades. While this trend analysis could not offer information about population oral health status of the whole state population because of lack of data in the CDHS series, it is reasonable to expect that the trend would mimic the changes of the oral health status of those attending school dental services.

Common indicators of dental service use include percentage of children visiting for dental care in the last 12 months and percentage of children making their most recent dental visit for a check-up. While there was some fluctuation over time, it appeared that patterns of dental service use remained consistent.

Patterns of oral health practice are indicators of individual behaviours that to some extent reflect health recommendations. The percentage of children who brushed at least twice a day remained stable over the last two decades. This might reflect the social norm of toothbrushing that has been established. The percentage of children who reportedly used standard fluoride toothpaste changed significantly as children aged. This reflects the health recommendation of the use of different types of fluoride toothpaste. There appeared to be a shift toward later introduction of standard fluoride toothpaste for children. In 2010–12, only one-half of children aged 7–8 years had started using standard fluoride toothpaste when the recommended age to start its use is 6 years.

8. Interpretation of findings

By A John Spencer, Loc Do, Kaye F Roberts-Thomson, Jason Armfield, Rhys Thomas, and Ben Stute

In the Introduction to this report two key challenges were identified in child oral health in Australia: (1) recognising and responding with appropriate population-level oral health promotion and prevention to the ongoing prevalence and severity of childhood oral disease, and (2) improving access to dental services so as to manage well the oral disease that is experienced and to increase the contribution dental services make to the prevention of individual children's disease experience. The purpose of this chapter of the report is to interpret the findings on child oral health, dental behaviours and dental visiting presented earlier, and to stimulate discussion about meeting these two challenges in Queensland.

8.1 Child oral health

8.1.1 Child dental caries

Just less than one-half of Queensland children aged 5–10 years have experienced caries in their primary teeth. On average, Queensland children have 2.0 primary teeth with caries experience. However, slightly less than one-quarter of all children have 4 or more teeth with caries experience. These Survey estimates are reasonably close to those derived from the surveillance of child oral health within the Queensland school dental services (the Child Dental Health Survey) which placed Queensland children at the higher end of caries experience in the primary dentition of children across the state and territories.

Within the four Queensland major regions described, children in Townsville had the lowest prevalence of caries and lowest caries experience scores (dmft or dmfs). The comparison with the geographically closest other region, showed very substantial differences between fluoridated Townsville and the previously non-fluoridated remainder of the Northern region. For instance, the prevalence of caries in the primary dentition was only 39.3% in Townsville with a caries experience of 1.4 teeth, while in the remainder of the Northern region the prevalence was 57.2% and the caries experience was 2.4 teeth.

Caries experience in the permanent teeth of Queensland children aged 6–14 years was some 29.5% and the caries experience of the permanent dentition was 0.7 teeth. About one in seven children had more severe caries experience in the permanent dentition. The Survey estimates are somewhat lower than those from the surveillance of child oral health within the Queensland school dental services. This may indicate a bias in estimates derived from the school dental service as participation in the service declines with progression through the school years.

Similar to the primary dentition, there were significant differences in dental caries experience in the permanent dentition between the four regions. Townsville's children consistently had the lowest prevalence and severity of dental caries in the permanent dentition. For example, some 34.7% of children aged 12–14 years in Townsville had dental caries experience compared to over 46% in the other three regions. Those same children in Townsville had on average 0.7 permanent teeth with dental caries experience, which was half of the average number of permanent teeth with caries in the other regions.

Childhood caries experience shows reasonably consistent social patterning i.e. variation across social groups in the population. Whilst only explored in a descriptive 'bivariate' manner in this report, childhood caries experience was consistently higher among children from households where parents had less education and lower incomes. There were also indicators of childhood caries like untreated decay that showed variation by Indigenous identity and residential location. It is important to both acknowledge the social patterning of childhood caries, but also the relatively modest strength of that patterning. This can be summarised by the observation that for a number of the indicators of caries still only a minority of children from a lower social position have a prevalence of the caries indicator and that a substantial prevalence of the caries indicators are found in children from middle and higher social position families. The consequence of this general observation is that approaches to the promotion of child oral health, and prevention of caries in particular, need to be universal, but with the capacity to deliver a greater benefit to those with more disease and in lower social positions in the community. This is termed proportionate universalism (Marmot 2010).

8.1.2 The use of fluorides in the prevention of caries

Water fluoridation

While Queensland gave early consideration to water fluoridation as a population preventive measure for caries, only Townsville (fluoridated in 1964) is a long-standing site of water fluoridation. There has been a history of research examining childhood caries experience in fluoridated Townsville and other non-fluoridated regions of Queensland, predominantly Brisbane (Slade et al. 1996).

Research conducted in collaboration between The University of Adelaide and Queensland Health's school dental services in 1991–92 is prominent in discussions on water fluoridation in Queensland over the last 15 years. The research showed children who were continuous residents of Brisbane had considerably more dental decay than their counterparts in Townsville, which had had fluoridated water since 1964. Not only did a higher percentage of Brisbane children have dental caries, their caries experience was also more severe.

The findings in this Survey on childhood caries across major regions of Queensland presented in this report support the benefit enjoyed by children in Townsville over those in the remainder of Queensland in oral health in 2010–12, reflecting the 'baseline' position as Queensland headed into its expansion of the coverage of water fluoridation. The broad region-level comparisons presented attest to the substantially better child caries experience in the primary dentition, with large relative and absolute advantage enjoyed by children in Townsville over the other three regions. Given the greater burden of early childhood caries in the population in general and its consequences which include infection, discomfort and pain, and may need to be managed by hospitalisation and treatment under general anaesthesia, this substantially better early childhood caries experience is not a trivial matter. Childhood caries in the primary teeth is a distressing, painful and costly issue for children and their parents.

The broad region-level comparison presented for childhood caries in permanent teeth in the Survey showed a consistent benefit to children living in Townsville over children in the remainder of Queensland. Overall caries prevalence in the permanent teeth was lowest in Townsville and the severity of caries experience (DMFT and DMFS) was substantially lower in Townsville than the other three regions. It is noted that the confidence intervals for some estimates are wide as the number of children examined was not large, particularly in some age

groups, and this increases the uncertainty about these few estimates. However, even with this caveat it remains that the caries experience of children in fluoridated Townsville was lower than that of children in the other regions which had no water fluoridation prior to 2009.

Prior to the *Water Fluoridation Act 2008*, only 4% of Queensland children lived in an area with water fluoridation. With the passage of the *Water Fluoridation Act* in 2008 a roll-out of the extension of water fluoridation was mapped out across 2009–12. By 2012 some 87% of the population was living in an area with water fluoridation. Areas not fluoridated at that time were generally smaller remote communities. These same communities were either not in scope for the sample for the Survey or would have very low weighting in the estimates. Therefore, by the time that the data were collected across 2010–12 most children in all three regions had just begun to receive fluoridated water to their homes and schools. (The more recent amendments to the *Water Fluoridation Act 2008* made in 2012 are after the completion of data collection in the Survey. Therefore the cessation of fluoridation among some communities has no bearing on the baseline findings presented.)

The general proposition regarding the fluoridation of water in many communities in Queensland is that children living in those areas would over time benefit from the exposure to fluoride and their caries prevalence and severity would decrease to the levels enjoyed by children in Townsville. A recent report from research in NSW provides support for what can be expected over time in Queensland children (Evans et al. 2009). The 2009 report compared the caries rate in the Blue Mountains in New South Wales, which was fluoridated from 1992, to the Hawkesbury area, which had been fluoridated in 1968. It found that the dental caries experience in the primary teeth among children aged 5–8 years in Hawkesbury did not reduce much from 1993 to 2003 (2.99 to 2.79 teeth per child), but across the same period in the Blue Mountains, the rate fell from 4.22 to 2.48 teeth per child. Among ages 8–11 years, the permanent caries experience in Hawkesbury children reduced from 1.96 to 1.92 teeth per child, but for the Blue Mountains children, the rate fell from 2.21 to 1.73 teeth. These findings provide a basis for predicting the improvements in childhood caries as a result of the extension of water fluoridation.

Water fluoridation is a universal or population-level measure. It also satisfies the desired characteristic of proportional universalism. This is because water fluoridation benefits those at risk thereby reducing caries most in those usually experiencing higher levels of caries (Slade et al. 1996). As caries in children is modestly socially patterned, children in lower social position families benefit most from the implementation of the measure. Social variation in caries in children is reduced.

Fluoridated toothpaste

This proportionate universalism sets water fluoridation apart from other caries preventive measures, which can only mimic a population-level approach. The ubiquitous nature of toothbrushing with fluoridated toothpaste comes close to being a population measure. However, there is variation in the frequency of toothbrushing which is again socially patterned. A small minority of children brush infrequently, diminishing the potential benefit they could receive in caries prevention. In the Survey, more of these less frequent brushers of their teeth are found in lower social position families. Hence, less rather than more benefit from toothbrushing will be enjoyed by these children, perpetuating their social disadvantage.

Other specific caries preventive measures are predominantly focused within dental services. This includes the use of fissure sealants to seal off susceptible pits and grooves of teeth from the caries process and several types of applied fluoride treatments. Clinical preventive services require a

dental visit. The social variation in regular dental visiting hinders the proportionate universalism of these clinical preventive services.

It is a combination of the greater effectiveness of water fluoridation in the prevention of caries and its desirable proportionate universalism that has made it the centrepiece of caries prevention in Australia. However, every reasonable effort needs to be taken to bring about an additive benefit to water fluoridation, i.e. fluoridated toothpaste use, and other clinical preventive measures.

Fluoride supplements

Areas without a history of water fluoridation have to some degree pursued alternative ways of providing an exposure to fluoride. One such approach is fluoride supplements (or tablets). Across the 1970s and 1980s fluoride tablets were promoted in many non-fluoridated areas. However, their use was found to be associated with dental fluorosis. This led to an ongoing process of revising the age of commencement and dosage of the tablet, generally reducing the fluoride intake across the early and pre-school years. By the early 1990s their use was less frequently advocated. This was in part a result of limited evidence that they were effective in caries prevention, most likely because use by many was spasmodic and not maintained over the long-term. Australia's guidelines on the use of fluorides, promulgated in 2006, no longer recommended their use. Instead it supported the notion of a water fluoride supplement, i.e. the dissolution of a fluoride tablet in a litre of water (ARCPOH 2006). However, the production and marketing of fluoride tablets by the oral health care product industry ceased and alternative sources were difficult to find. Therefore, it was not surprising that about one in five Queensland children in the Survey were reported to have used fluoride tablets or drops at some time in their life, but it was surprising that even among the youngest children in the Survey their use was reported by one in ten children.

Fluoride mouthrinses

Nearly one in four children had reportedly used a fluoride mouthrinse at some time in their life. Fluoride mouthrinses are not recommended for children under the age of 10 years, but the successful marketing of mouthrinses for breath freshness for adults has probably carried mouthrinses into many homes where guidelines on their use are likely to be unknown. The use of mouthrinses was not associated with social position of the family.

Professional application of fluoride

Just over one-quarter of Queensland children in the Survey reported having fluoride applied to their teeth by a dental professional, the percentage increasing across older aged children. This may have been in an attempt to compensate for the very limited coverage by water fluoridation up to 2009. However, the application of fluoride to teeth (professional fluoride applications of solutions, gels, or fluoride varnish) was quite strongly socially patterned with more children from higher education and income families, living in major cities, last visiting for a check-up reporting this clinical preventive treatment. Interestingly a very low percentage of children were reported to have been 'prescribed' a fluoride treatment for home use.

Overview of the use of other fluorides than water fluoridation

Several aspects of the reported use of other fluorides are important. First, their level of use clearly did not compensate for the lack of coverage by water fluoridation as only a maximum of a third of children reported use of an alternative fluoride treatment. Second, in most situations the use of these alternative fluoride treatments to water fluoridation was positively associated with social position of the family, yet caries experience is negatively associated with social position of the family. This equates to an inverse 'preventive care' low where those most in need of prevention receive least preventive care. Third, while there is some potential for these fluoride treatments to be efficacious with ideal patterns of use, such ideal use is rare. Fourth, some of these alternative fluoride treatments are not recommended at all or not for young primary school-aged children. This is largely because of the risk of dental fluorosis.

8.1.3 Dental fluorosis

The use of fluoride for oral health has always had the aim of achieving an appropriate balance between the prevention of caries and the possibility of the only other established health outcome of exposure to fluoride at the levels currently associated with communities in Australia, dental fluorosis. This balance has been understood since the discovery of fluoride as the cause of tooth 'mottling' in the 1930s. What is desired is the near maximal prevention of caries in children without an unacceptable level of dental fluorosis. Findings of research over the last several decades on the prevalence and severity of dental fluorosis have been central to Australia's development of guidelines for the use of fluorides. As dental fluorosis is a developmental condition, what is important is the exposure pattern (and systemic intake) of fluoride in the tooth forming years, generally up to 6 years of age, although most of the anterior and more visible teeth have a window of exposure around 1–3 years of age.

Preventing an unacceptable level of dental fluorosis

Australia's guidelines on the use of fluorides have given primacy to the continued fluoridation of water supplies between 0.6 and 1.1 mg/L water depending on climate. This is because water fluoridation provides a benefit to individuals at all ages (Rugg-Gunn and Do 2012); (Griffin et al. 2007). Whilst international research shows that water fluoridation is associated with an increase in the prevalence of fluorosis, broadly to a prevalence of any fluorosis of 5–15%, that fluorosis will be at a very mild or mild level. When additional sources of fluoride are available through toothpaste use by young children then fluorosis prevalence increases to around the 20–30% level and some moderate fluorosis is observed. The prevalence and severity of fluorosis can be kept lower by targeting the use of toothpaste by young children. This has been pursued by the introduction of a low-fluoride children's toothpaste for use up to 6 years of age and a range of practices to reduce the amount of toothpaste swallowed by young children (small sized brush, small pea or smear of toothpaste used, supervision by parents, spitting-out without rinsing, not eating/licking toothpaste) (Riordan 2002); (Do and Spencer 2007).

Unacceptable dental fluorosis

These approaches in Australian states over the last two decades have reduced and then controlled the prevalence and severity of fluorosis. In Western Australia and in South Australia, no children have been identified in research studies with a severity of fluorosis which is accepted to be a 'harm'. The definition of what constitutes a 'harm' has in relation to fluorosis evolved over time. Historically dentists decided what was likely to be recognised by the lay person as a change

in tooth colour and appearance and what level of change would be unacceptable (or a harm). However, this judgement has had two other elements overlaid on it. First, changes that affect the integrity of the dental enamel, like pitting or loss of enamel, have been defined as a harm by the wider health professions on the basis that such changes might make teeth more, not less, susceptible to caries. Second, community preferences have become central to what is a judgement about aesthetics (Chankanka et al. 2010). The community has been found to recognise quite early or mild changes to fluorotic teeth. However, both children and their parents regard very mild and mild fluorosis as *more* not less aesthetically desirable (Do and Spencer 2007). Moderate severity fluorosis is regarded as no different to non-fluorotic teeth. This somewhat counter-intuitive finding may be explained by the desirability of white teeth in the community, with low severity dental fluorosis being recognised as whiter teeth than teeth without fluorosis.

Dental fluorosis in Queensland children

In the present Survey, there was an examination of the baseline prevalence and severity of fluorosis prior to the extension of water fluoridation to much of Queensland. Any fluorosis (a TF score of 1+) was found to have a prevalence of 8.2%. In Townsville, the prevalence was 11.3% and the remainder of the regions the prevalence was from 6.6 to 10.6%. There was little variation in the prevalence of fluorosis by social characteristics of the family. It is important to recognise that non-fluorotic changes to dental enamel were differentially diagnosed from fluorotic changes. Non-fluorotic changes had a reasonably similar prevalence to fluorotic changes. Such non-fluorotic changes are frequently labelled as fluorosis by those without specific training in the diagnosis and measurement of fluorosis.

Overview of dental fluorosis

The findings of the Survey on the prevalence of fluorosis are important in several ways. First, the prevalence and severity of fluorosis was low, even in fluoridated Townsville. The reason for this needs to be teased out, but it could be that many Townsville children have histories of residential mobility that have them living outside that fluoridated area for some of the time that their teeth are at risk of developing fluorosis, or that the portion of their fluid intake that is fluoridated tap water is low. If either of these were correct, then a lower level of caries prevention would also be found, yet the caries prevention estimates in the Survey were reasonably high. Maybe the caries prevention effects would be even greater if residential movements and fluid consumption patterns were accounted for in analyses. So this area needs further investigation.

Second, with the roll-out of water fluoridation across Queensland, the exposure of young children to fluoride (and fluoride intake) would be expected to increase. If so, then children born and raised in these newly-fluoridated areas would be expected to have a slightly higher prevalence and severity of fluorosis than seen in the Survey. This needs to be tested in subsequent surveys in Queensland. The roll-out of water fluoridation will also place greater emphasis on the adherence to the guidelines on the use of fluorides in Queensland.

8.2 Dental visiting

As noted in the Introduction, access to dental care is a major policy issue in Australia. This report has focused on Queensland children's first visit to a dental provider and the current visiting behaviour.

8.2.1 Child's first dental visit

2 years of age

There is variation among dental professional groups about the recommended age at which a child should make their first dental visit. While some dental professional groups have recommended that a child should make their first visit soon after the eruption of the first teeth i.e. soon after 6 months of age, this recommendation is mostly not acted upon by parents. Public health groups have tended to recommend that a child make its first visit at around 2 years of age. This has also been accepted as the earliest age at which Federal Government funding for dental care will flow under the new Child Dental Health benefit scheme. It is for this reason that this Survey report has documented the proportion of Queensland children who have made their first dental visit at 2 years of age or younger. About one-fifth of children have made such a visit. This proportion was similar across children who at the time of the Survey were aged from 5 to 14 years. It is therefore quite stable over time. The percentage was higher for children in households where the parents had higher education, higher income, and who lived in major cities. The percentage was lower among Indigenous children and children who made their last dental visit for a dental problem.

A dental check at around 2 years of age is recommended so as to identify children with early stages of dental caries in the primary teeth which can be arrested or reversed with changes to diet at home, individual dental behaviours and preventive measures like the application of fluoride varnish. For the vast majority of children and their parents a dental visit at this age will be an uneventful introduction to the dental environment, providing reassurance to parents about their child's oral health and support for them to maintain that situation. However, the importance of the identification of children with initial dental caries at around 2 years of age lies with the avoidance of more invasive interventions for more advanced disease. Such interventions are frequently performed under general anaesthetic in hospitals. At present the identification of a child with advanced caries in the primary teeth occurs predominantly at ages 4 and 5 years and in association with a dental visit prompted by a dental problem, i.e. dental pain. A small minority of children's first dental visit is for a dental problem, about one in seven children. Hospital admissions have increased in rate in Australia over the last two decades and dental problems are the major cause of a hospital admission for children aged 0–4 and 5–9 years in Australia. These interventions in hospital are traumatic for the child and parents, carry a risk of complications and are costly.

Prevention of early childhood caries

Identification of children with early childhood caries is important, but it remains a secondary prevention activity. The opportunity exists to further develop primary preventive efforts built around the parents in the lead-up to the birth or across the child's first year of life. There is an increasing literature on the success of oral health promotion efforts using reasonably straightforward approaches like anticipatory guidance to conveying information to parents and

providing support to parents across the early years of a child's life (Plutzer and Spencer 2008); (Kamila et al. 2012). A greater emphasis on these approaches would help turn the first dental visit into a positive affirmation of the success of parents in establishing good oral health.

5–6 years of age

The sizeable proportion of children who have never visited a dental provider by age 5–6 years also attests to the substantial change required in dental visiting early in a child's life. Nearly one-third of children aged 5–6 years had not yet made a dental visit. This percentage falls away sharply as children move through their early schooling. This may be due to the success of the school dental services in their focus in delivering services to children from a particular age. Clearly in the past this has been at the age of starting school. The percentage of children who have not made a dental visit at age 5–6 years is higher among children whose parents have less education and income. The large proportion of children who have not made a first visit in their early pre-school years and whose first visit is for a dental problem, indicate the magnitude of the shift in the focus required on dental visiting early in a child's life.

8.2.2 Usual dental care

Regular dental visits

Two-thirds of Queensland children who have made a dental visit reportedly have a regular pattern of dental visiting. This regular pattern could vary in the frequency of visiting, for instance, twice or once a year through to once every two years. The frequency of dental visits should reflect the different oral health needs and risk of oral disease of children. However, it is likely that the varying frequency of visits is determined by expectations among dental providers in the private sector where twice or once a year is advocated and structural factors in the service cycles of the school dental services, where once every two years is a more common practice. Regularity of the pattern of dental visits develops over the school years, with three-quarters of older children reporting a regular pattern of dental visiting. A regular pattern of dental visiting is also positively associated with parental education and income.

Irregular dental visits

The converse to regular visiting is irregular visiting. Just less than one-quarter of Queensland children in the Survey had an irregular visiting pattern. This proportion was reasonably similar across the age groups. It was higher among those children from households where parents had less education or low income. It was also lower among those children whose reason for their last dental visit was a dental problem. Children who visit irregularly and for a dental problem are likely to have oral disease diagnosed late, limiting treatment options to more invasive procedures and receiving dental care that will focus on the immediate management of problems rather than the prevention of future disease. This pattern is repeated across the childhood years contributing to the different oral health outcomes seen in the variation of oral health status by reason for last visit.

Although the proportion of children with irregular dental care is not high, this is a difficult group to access and modify in their behaviour. While irregular visiting is associated with parental education and income, this association is only of a modest strength. The majority of children in low parental education and income households are not irregular visitors and more children with an irregular pattern of dental visiting exist in households of higher parental education and

income. This creates the policy challenge in that these children are not readily identified and targeted. As a result, policy to support children moving into a pattern of regular dental visiting needs to be broader in its target than just low income families, disadvantaged schools or low socioeconomic areas.

Strategies to improve dental visiting

There are alternative arrangements in the dental services system that can encourage regular dental visiting. Such alternatives might be managed through either the school dental services or private dental practices. The school dental services were the place of last visit for approximately 55% of Queensland children. The frequency of regular dental visiting in the school dental services is generally lower reflecting the desire to 'ration' services because of resource constraints. However, several different directions have been pursued across the Australian states and territories to tailor the frequency of visiting to apparent child needs. These approaches include establishing different frequencies for groups of children at disadvantaged schools or schools in different socioeconomic areas. Alternatively, different frequencies can be established for individual children thought to be at different risk of future disease. The ease with which these approaches can be pursued depends on the way in which dental care is organised in a state or region. For instance, different frequency of visits for groups fits well with itineraries for mobile vans or portable equipment moving from school to school, while individualised frequencies fit better with services that provide appointments at fixed clinics. Of course, it would be possible to involve a mix of these approaches.

For those children who visit private practices the same fundamental issues of tailoring for groups or individual children exist. There needs to be stronger recognition of the desirability of varying frequency according to risk of disease. More commonly, providers have been inclined to increase the frequency for those considered at 'high' risk, but not so inclined to lower the frequency below the truisms of twice or once a year for those at 'low' or 'no' apparent risk. There is the opportunity with the announced commencement of 'Grow up Smiling' in 2014 to give consideration to using financial incentives or barriers to bring about more tailoring and therefore greater variation in the frequency with which children make dental visits in the private sector.

Regardless of whether parents seek care for their child through school dental services or private practices, there needs to be a higher level of oversight and an active management of each child's frequency of visiting. This is required to reduce or eliminate that percentage of children who have unacceptable periods of no visits and who exist largely outside the dental system. There needs to be program responsibility to reach out, make contact with and then retain such children in a pattern of regular dental visiting. These are the outreach activities which are briefly discussed in the Report of the National Advisory Council on Dental Health February 2012 (NACOH 2012). As the Child Dental Health benefit scheme is built around individual child entitlements to be centrally managed by Medicare Australia there is the ability to track and profile dental visiting over time and identify children who do not have an acceptable pattern of dental visiting. This can be extended to children in identified population sub-groups considered at greater risk of irregular visiting such as those attending 'special' schools or living in remote areas.

Types of dental care

While the central focus on dental visiting is to move all children into a pattern of regular dental visits with the time interval between visits dependent on their needs, a further aspect of access to dental services concerns the nature of the care they receive. The first aspect of this should be the provision of clinical preventive services. Preventive services have grown to be a substantial proportion of the services provided by dental providers in Australia but these are dominated by two services: scaling and cleaning, and the prophylaxis. This is of concern as these may be necessary, but certainly not sufficient services in the clinical prevention of caries. Several clinical preventive services have well-established efficacy. These include fluoride varnish and fissure sealants. The prevalence and number of sealants were measured in the Survey. While sealants can be applied to primary teeth their efficacy in those teeth is low. Sealants can also be applied to permanent teeth at any stage in the life course. However, their efficacy is high if they are applied to a tooth soon after its eruption into the mouth. Hence, recently erupted permanent teeth across the ages 6 to 14 years are candidates for fissure sealants. Yet, in this Survey only 22% of children had 1 or more sealants and on average only 0.6 teeth had a sealant placed. This implies that the children thought to be candidates for sealants had a little more than two teeth with a sealant placed. Both the percentage of children with a fissure sealant and the number of teeth with a fissure sealant in those with this preventive treatment are low and leave room for a greater application of this approach in clinical prevention.

Dental services have traditionally been dominated by diagnostic services like the dental examination and radiographs and then restorative or filling services (Brennan and Spencer 2006). It has not been unusual for service activity in programs to be measured by number of examinations conducted and fillings placed. While it is important that the proportion of the caries experienced that is not treated (the untreated decay in this Survey report) is low, there are a number of challenges in the treatment philosophy applied to the process of filling a tooth with some level of caries. These challenges are captured in the 'minimum intervention philosophy' where the goal is to conserve as much tooth structure as possible. The ultimate test in the application of this philosophy is whether a tooth with a carious lesion actually needs a filling at all or whether a fissure sealant or surface protection can be applied that does not require 'cutting' of the tooth. Such alternative treatments are more open to the dental provider and child when a carious lesion in a tooth is an 'initial' lesion. In this case the carious lesion might be successfully treated by entirely preventive means and the caries process reversed or arrested. However, there is evidence that Australian dentists are less willing to explore such alternatives even for the initial carious lesion (Brennan et al. 2000); (Brennan and Spencer 2007).

8.2.3 Reason behind choice of dental provider

In the Survey more parents reported that location was the reason for their choice of dental 'clinic' for their child rather than cost, perceived quality of the care or emphasis on prevention. Just over half of all parents indicated that location was the reason for choice of dental clinic. Slightly more than one-quarter indicated that quality of care was the reason, while just less than one-quarter reported that cost was the reason. A disappointing one in ten parents indicated that an emphasis on prevention was the reason for choice of dental clinic. While reasonably similar proportions of parents across social groups reported that location was the reason for choice, a higher percentage of parents with higher education and income reported quality of care as the reason for choice and a lower percentage of these same parents reported cost as the reason for choice of the dental clinic.

The meaning of location needs to be examined in order to understand the elements that may be part of this response. It could be simply distance to travel to a dental clinic from home or school, or it could be elements of the need for parents to be in attendance or the hours at which visits can be made to a clinic. Cost is frequently identified as a dominant barrier to accessing dental care. Its reasonably low level of reporting in the Survey may reflect that over half of the children in the Survey last visited a school dental service clinic and therefore the cost of dental care was not a factor. Quality of care should be a strong reason for choice of dental clinic. The technical quality of dental care is difficult for parents to judge. Instead quality tends to reflect judgements on the physical facility, equipment, friendliness and rapport with staff. The low percentage of parents reporting that an emphasis on prevention was the reason for choice of dental clinic needs further consideration. It may reflect little perceived emphasis on prevention across dental clinics, or few apparent differences in emphasis on prevention.

Given the plurality of the way in which dental care is provided in Queensland and the commencement of the Child Dental Health benefit scheme in 2014, the question of how and why parents make choices about where to take their child for dental care will assume greater importance. The finding that only a low percentage of parents made the choice on the basis of cost indicates that removal of the cost barrier to dental care for children in the private sector will not automatically lead to a large proportion of existing users of the school dental services moving the child's dental care into the private sector.

8.2.4 Place of last dental visit

A little more than half of the children in the Survey reportedly last visited the school dental service. The percentage of children who last visited the school dental service increased across age groups from ages 5–6 years to ages 9–10 years, then decreased through to ages 13–14 years. This pattern in the coverage of the school dental service by age is observed across all state and territories. Coverage grows across the first few years of schooling, and then falls away at the end of primary school and especially at the transition to secondary school.

Visiting the school dental service is socially patterned with a higher percentage of parents with less education and low income reporting that their child last visited the school dental service. There is also a relationship with residential location, with a higher percentage of parents reporting their child last visited the school dental service in regional and remote areas. As a result of the association with location, a higher percentage of Indigenous parents reported that their child's last visit was to the school dental service. A higher percentage of children who last made a visit for a dental problem were reported to have last visited the school dental service. These variations in visiting the school dental service indicate that there are systematic differences in the availability and obtainability of the school dental service and private dental services that result in different probabilities of the use of each as alternative dental clinics.

8.2.5 Rating of dental care

The vast majority, i.e. three-quarters, of parents rated the dental care their child received to be of high quality. This varied little by social position of the family, with only household income being associated with this rating of quality. The rating of quality did not vary by Indigenous identity, parents' country of birth, parental education, residential location or the reason for the last visit. This lack of variation is an important finding, indicating that parents do not perceive any systematic differences in the way in which the dental services system or dental providers look after the oral health of their child.

8.3 Preventive dental behaviours

Toothbrushing and toothpaste use

At the individual-level there are several well-known dental behavioural factors that can decrease the risk of oral disease. In this report these have been grouped in the chapter on dental health behaviours. They included age of commencement of toothbrushing with toothpaste, frequency of toothbrushing and type of toothpaste used.

Approximately half of the children commenced toothbrushing with toothpaste before 18 months of age. While some children may have brushed even earlier without toothpaste, most children began brushing with toothpaste. It is recommended that children's teeth be cleaned (wiped or brushed) from the time of the eruption of teeth, but that toothpaste be introduced at 18 months of age (ARCPOH 2006). The timing of the introduction of toothpaste is important in establishing the best balance between the prevention of caries and the prevention of fluorosis. Pre-school children swallow a considerable proportion of the toothpaste foam in their mouth, the proportion being higher in younger children. Previous research involving Queensland children showed that a marginally higher percentage brushed with toothpaste by the age of 2 years, with an important 10% using toothpaste by 6 months of age and an equally worrying 16% delaying brushing with toothpaste until after 3 years of age (Armfield and Spencer 2012). The former group are at higher risk of exhibiting dental fluorosis, while the latter group are at higher risk of caries (Do and Spencer 2007).

Children in families whose parents have higher educational attainment and income are at greater risk of dental fluorosis from the early use of toothpaste. Conversely, Indigenous children and children born overseas and children who made their last dental visit for a problem are at lower risk of dental fluorosis from brushing early with toothpaste, but at a higher risk of dental caries from the delayed use of fluoridated toothpaste.

Age of commencement of using toothpaste is but one important aspect of toothpaste use. The type of toothpaste used, low-fluoride children's toothpaste or regular 'adult' toothpaste is also an important aspect of balancing the prevention of caries and fluorosis. To some extent the type of toothpaste used can mitigate other aspects of toothpaste use that might normally be associated with a risk of dental fluorosis. In the Survey, three-quarters of Queensland children aged 5–6 years were brushing with a low-fluoride children's toothpaste. Such toothpaste is recommended up to 6 years of age. This is a similar proportion to what was reported in previous research involving Queensland children. This shows a high level of adherence to the guidelines for the use of a low concentration fluoridated toothpaste by young children. However, quite high proportions of children aged older than 6 years were reportedly still using low-fluoride children's toothpaste. This use extended up into the teen years. This is not recommended, as the upper age when dental fluorosis might be associated with the ingestion of fluoridated toothpaste is generally regarded as 6 years of age. Older children using low-fluoride children's toothpaste were not at risk of dental fluorosis, but may not be achieving adequate protection against caries from a low-fluoride children's toothpaste. There was only modest social variation in the type of toothpaste used, with children from households with higher parental education and income more inclined to use low-fluoride children's toothpaste at 5–6 years of age.

Age of commencement of use of toothpaste and type of toothpaste used are usually packaged together with other main messages in Australia's guidelines on the use of fluoridated toothpaste. Toothpaste should be applied to a small or child-sized toothbrush by a parent for young children. A smear or small pea-sized amount should be applied. Toothbrushing should be performed by

the parent, or parent-supervised. Toothpaste foam should be spat out. The mouth should not be rinsed with water. Rinsing both increases the amount of toothpaste swallowed by the child though reflex swallowing, and reduces the amount of toothpaste and fluoride left at the tooth surface to assist in prevention of caries. While regular strength toothpaste should be used from the age of 6 years, a pea-sized amount should still be used and toothpaste foam spat out without rinsing.

The patterns of dental behaviours with regard to toothpaste use seem reasonably similar to those reported involving children from other states such as Victoria, South Australia and Tasmania. However, balancing prevention of caries and dental fluorosis becomes a more important matter in areas with water fluoridation and consideration might be given to a campaign to inform parents in Queensland about the Australian guidelines for the use of fluoridated toothpaste. Such activities have been pursued by state or territory school or community dental services which are a substantial provider of dental services to children, and by the Australian Dental Association.

Nearly three-quarters of the Queensland children in the Survey were reported to brush their teeth the recommended twice a day. This is a similar proportion to what was reported in previous research involving Queensland children (Armfield & Spencer 2012). It did not vary by age of the child. The remainder tended to brush less frequently, predominantly once a day. Brushing twice a day was more common among those children in households where the parents had higher levels of education and income and lived in major cities. A lower percentage of Indigenous children brushed twice a day. Less frequent brushing provides less protection against caries (because there is less frequent exposure to fluoride in the toothpaste used) and brushing twice daily is also recommended for gingival health. Toothbrushing twice a day remains a central activity in the individual prevention of caries and gingivitis.

The effective promotion of individual-level dental health behaviours needs to be coordinated and reinforced across all sectors associated with oral health. The oral health care product sector has a substantial role to play in both the technology behind their products but also the messages given or implied in their product advertising. Dental professionals have a central role as the most credible source of information to children and their parents when making a dental visit. They have both the opportunity to engage in one-on-one advice and instruction and to reinforce key messages. Public health authorities have a role in promoting research that informs recommended behaviours and in campaigns to promote those behaviours. Each contributor needs to support and reinforce key messages and behaviours by children and their families (National Oral Health Promotion Clearing House 2011). The announced federal Government initiative on oral health promotion could provide important leadership and direction for improving dental health behaviours.

8.4 Determinants of child oral health

All of the aforementioned issues have a bearing on the magnitude of the challenge to improve child oral health and to reduce social inequalities in child oral health. The identification of the numerous issues and the relationship between them at an individual child, family, school and community level poses both difficulties and opportunities for programs to improve child oral health and reduce social inequalities in child oral health. The difficulty arises from the limitations that will exist if programs to improve child oral health are focused on just one level of action. There is also a need to conduct programs with multiple actions at different levels to get an additive effect. This increases the complexity of the programs that need to be implemented.

The opportunity exists for some selectivity in the actions included. The existence of a number of factors at a single level actually creates a wide range of actions from which to choose. There is a compelling argument to give priority to actions that are more universal, i.e. reach large numbers of children, are more passive, i.e. require little individual effort, and are more proportionate, i.e. benefit mostly those with the greatest level of oral disease (Frieden 2010). While this might start with water fluoridation, it needs to be joined up with actions at other levels that also are consistent with the criteria for priority. A second aspect of choice among actions might be their relevance to other health problems. If an action addresses a common risk for several health problems then there is the potential to harness more resources for pursuing change and for a greater incentive for change being achieved. An example of this potential is the common interest in sugars in processed foods and drinks and their relationship to childhood obesity and dental caries.

Glossary

95% confidence interval

Defines the uncertainty about an estimated value. There is a 95% probability that the true value falls within the range of the upper and lower limits.

Absolute difference

The difference between two values calculated by subtracting one value from the other.

Average number of decayed, missing and filled primary teeth (mean dmft score)

Sum of individual dmft values divided by the population of children aged 5 to 10 years.

Average number of decayed, missing and filled permanent teeth (mean DMFT score)

Sum of individual DMFT values divided by the population of children aged 6 to 14 years.

Calibration

A procedure to promote standardisation between examiners performing the oral examinations.

Canine

One of four 'eye teeth' positioned next to the incisors and used for tearing food.

Census

The Census of Population and Housing conducted every 5 years by the Australian Bureau of Statistics.

Cavitation

Dental decay that has progressed to loss of tissue integrity, forming a cavity.

Dental caries

The process in which tooth structure is destroyed by acid produced by bacteria in the mouth. See dental decay.

Dental caries experience (Dental decay experience)

The cumulative effect of the caries process through a person's lifetime, manifesting as teeth that are decayed, missing or filled.

Dental decay

Cavity resulting from dental caries.

Dental sealants/fissure sealants dmft/dmfs

An index of dental caries experience measured by counting the number of primary decayed (d), missing (m), and filled (f) teeth (t) or surfaces (s).

DMFT/DMFS

An index of dental caries experience measured by counting the number of permanent decayed (D), missing (M), and filled (F) teeth (T) or surfaces (S).

Enamel

Hard white mineralised tissue covering the crown of a tooth.

Epidemiology

The study of the distribution and causes of health and disease in populations.

Erupted tooth

A tooth that has emerged through the gums into the mouth.

Examination protocol

Methods and guidelines for conducting standardised oral examinations conducted in a survey.

Extraction

Removal of a natural tooth.

Fluoride

A naturally occurring trace mineral that helps to prevent tooth decay.

Fluorosis

Discolouration or pitting of the dental enamel caused by exposure to excessive amounts of fluoride during enamel formation.

Gingiva

Gum tissue.

Gingivitis

Redness, swelling or bleeding of the gums caused by inflammation.

Incisor

One of eight front teeth used during eating for cutting food.

Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD)

One of four indices measuring area-level disadvantage derived by the Australian Bureau of Statistics. The IRSAD is derived from attributes such as low income, low educational attainment, high unemployment and jobs in relatively unskilled occupations.

Indigenous identity

A person who states that they are of Aboriginal and/or Torres Strait Islander descent is an Indigenous Australian.

Mandible

Lower jaw.

Maxilla

Upper jaw.

Primary teeth

Baby teeth (deciduous teeth).

Permanent teeth

Adult teeth (secondary teeth).

Plaque

A film composed of bacteria and food debris that adheres to the tooth surface.

Prevalence

The proportion of people with a defined disease within a defined population.

Public dental care

State or territory funded dental care available to adults with low income or other forms of social disadvantage.

Statistical significance

An indication from a statistical test that an observed association is unlikely (usually less than 5% probability) to be due to chance, created when a random sample of people is selected from a population.

Trend

The general direction in which change over time is observed.

Unerupted tooth

A tooth that has failed to emerge through the gums into the mouth.

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