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Socioeconomic differences in children's dental health

The Child Dental Health Survey, Australia 2001

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AIHW

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Abbreviations

d	deciduous decayed teeth
D	permanent decayed teeth
dmft	deciduous decayed, missing (due to decay) and filled teeth
DMFT	permanent decayed, missing (due to decay) and filled teeth
f	deciduous filled teeth
F	permanent filled teeth
m	deciduous teeth missing due to decay
M	permanent teeth missing due to decay
SD	standard deviation
SEIFA	Socio-Economic Indexes for Areas
SiC	Significant Caries Index
SiC^{10}	Significant Caries Index (10%)

Symbols

n.a.	not available
–	nil or rounded to zero
. .	not applicable

Executive summary

The Child Dental Health Survey provides yearly information on the dental health of children attending school dental services in Australia. This report describes and discusses the survey and presents analyses for 2001. The data cover 110,834 children from all states and territories except for New South Wales.

In 2001:

Among 12-year-olds

- over 40% had some history of decay in their permanent teeth – that is, one or more decayed, missing or filled permanent teeth
- on average they had just one decayed, missing or filled permanent tooth
- but the 10% with the most extensive history of tooth decay had about five times the national average of decayed, missing or filled teeth.

Among 6-year-olds

- nearly one half (47.3%) had a history of decay in the deciduous ('baby') teeth
- on average they had two (1.9) decayed, missing or filled deciduous teeth
- but the 10% with the most extensive history of tooth decay had almost nine deciduous teeth affected, which was about five times the national average.

International and social comparisons

- children's dental health in Australia is better than in many other countries. Of the 41 countries with comparable national data available, Australia had the fifth lowest average number of decayed, missing and filled permanent teeth among 12-year-olds
- however, children from disadvantaged socioeconomic areas in Australia still have poorer dental health than other Australian children. Across all ages, children residing in less affluent areas have more decayed, missing and filled teeth than children residing in the more affluent areas
- the social gradient in children's dental disease was different in metropolitan areas compared with rural or remote regions of Australia. In rural and remote regions, the average amount of dental decay was elevated in children who lived in all but the most affluent areas. In contrast, in metropolitan cities there was a consistent trend of increasing levels of decay with increasing levels of disadvantage.

Introduction

This publication describes the patterns and service provision relating to children's dental health in Australia in 2001. The publication's tables and figures describe the demographic composition of the sample, deciduous and permanent decay experience, the extent of immediate treatment needs, prevalence of fissure sealants and other relevant information. Tables showing national trends and state/territory comparisons precede an examination of differences in dental health between areas with varying socioeconomic status, and international comparisons. The publication also describes the survey methods and discusses the findings presented in the national tables.

The dental health of children receiving care in state/territory school dental services has been monitored since 1977. Between 1977 and 1988 the monitoring was managed centrally by the Australian Government Department of Health as an evaluation of the Australian School Dental Scheme. In 1989 responsibility for collecting national data was transferred to the Australian Institute of Health and Welfare's Dental Statistics and Research Unit at The University of Adelaide, where it is conducted through the Child Dental Health Survey.

Description of survey methods

Source of subjects

Data for this report have been derived from the annual Child Dental Health Survey, which monitors the dental health of children enrolled in school dental services operated by the health departments or authorities of Australia's six state and two territory governments (results from New South Wales are excluded in the current report due to the poor representativeness of the sample). Children are enrolled from both public and private schools. The care typically provided by the school dental services includes dental examinations, preventive services and restorative treatment as required. However, there are some variations among state and territory programs with respect to priority age groups and the nature of services. As a consequence, there are variations in the extent of enrolment in school dental services, with some jurisdictions serving more than 80% of primary school children and others serving lower percentages.

Sampling

The data for the Child Dental Health Survey are derived from routine examinations of children enrolled in the school dental services. At the time of examination, children are sampled at random by selecting those born on specific days of the month. Victoria and Tasmania adopt other systematic sampling procedures based on a random sample of cases.

Different sampling ratios are used across the states and territories according to the scheme presented in Table 1. National data for the Child Dental Health Survey therefore constitute a stratified random sample of children from the school dental services. Children not enrolled with the school dental service are not represented in the sample.

Table 1: Sampling ratios for Australian states and territories, 2001

State/territory	Sampling ratio[(a)]	Days of birth
New South Wales	. .	. .
Victoria	1:8	Systematic
Queensland	1:15	1st and 6th
	1:1	Any[(b)]
Western Australia	1:8.5	28th, 29th, 30th, 31st
South Australia	1:1	Any
	1:5	13th, 26th to 31st[(c)]
Tasmania	1:2.5	Systematic
Australian Capital Territory	1:2.5	1st to 16th
Northern Territory	1:1.9	1st to 16th[(d)]
	1:1	Any[(e)]

. . = Not applicable due to exclusion of NSW from 2001 data collection

(a) Sampling ratios are approximate only.

(b) 6- and 12-year-old children from the Gold Coast.

(c) From non-metropolitan clinics who have previously participated in the Child Fluoride Study.

(d) Includes Darwin.

(e) Includes all Northern Territory outside of Darwin.

Stratification aims to provide similar numbers of children from each state and territory. However, due to full enumeration in South Australia, the number of children sampled in this state is considerably larger than for the other states and territories. In addition, differences in administration and local data requirements of the services have created some variation among the other states and territories in the number of children sampled.

Data items

Data items in the Child Dental Health Survey are collected at the time of routine clinical examinations conducted by dental therapists and dentists. The recorded characteristics of sampled children include some demographic information, including the child's age and sex.

The birthplace and Indigenous status of both child and mother are considered to be two items important to a health monitoring survey (Health Targets and Implementation Committee 1988). Both items have previously been obtained from information from the patient's treatment card or medical history. However, due to the increasingly limited recording of this information by the state and territory school dental services, it has not been included in the current report.

Service provision information includes the dates of current and previous examinations (if the child had been examined previously within the school dental services) and is dealt with in detail within state- and territory-specific reports. Information on last examinations was not collected in South Australia as a result of changes to the data collection method in that state.

The dental health status of sampled children covers the four areas listed below:

1. Deciduous decay experience is recorded as the number of deciduous teeth that are decayed, missing because of dental decay or filled because of dental decay, and is based on the coding scheme of Palmer et al. (1984). These are referred to as dmft.

2. Permanent decay experience is recorded as the number of permanent teeth that are decayed, missing because of dental decay or filled because of dental decay, and is based on the World Health Organization protocol (WHO 1997). These are referred to as DMFT.

3. Immediate treatment needs are designated if, in the opinion of the examiner, the child has, or is likely to develop within four weeks, pain, infection or a life-threatening condition (WHO 1997). Data collected for the current study do not include information on the immediate treatment needs of children from Victoria, Western Australia, Tasmania or the Australian Capital Territory.

4. Fissure sealants are recorded as the number of teeth, otherwise sound and not restored, which have a fissure sealant. This data item was introduced in most states and territories in 1989.

All states and territories do not collect some data items uniformly. Consequently, some of the tables in this report refer only to specific states and territories.

The diagnostic criteria employed are based on the clinical judgement of the examining dental therapist or dentist. They follow written criteria for the data items described above; however, there are no formal sessions of calibration or instruction in diagnosis undertaken for the purpose of the survey, and there are no repeat examinations for the purpose of assessing inter- or intra-examiner reliability.

Weighting of data and data analysis

National data contained in this report consist of counts, averages, standard deviations and percentages that have been weighted to represent the relevant state- and territory-specific populations of children aged 4–15 years. Where computed state or territory age-specific indices resulted in a relative standard error exceeding 40%, or where the percentage of children sampled was considered very low, the age group for that jurisdiction was excluded from the analysis. As a result, 4-year-old and 15-year-old children from both Victoria and the Australian Capital Territory were excluded. Hence, results for 4-year-old and 15-year-old children should be interpreted with due care and with appreciation that they may not be representative of the Australian child population.

The weighting procedure is necessary since the Australian sample does not contain representative percentages of children from each state and territory. Unweighted estimates would result in over-representation of children from South Australia or from less populous states or territories and under-representation of those from more populous jurisdictions. The relative sample sizes and population estimates by state and territory as a percentage of the total sample and of the Australian population (4–15 years of age) are shown in Figure 1.

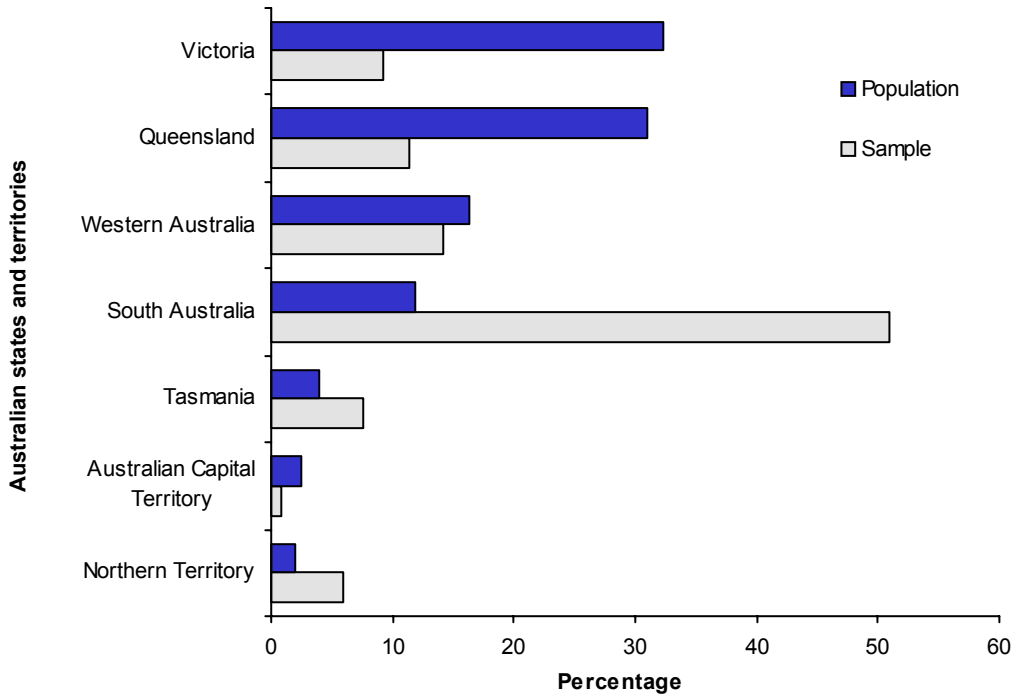


Figure 1: Percentage of children by state and territory for sample and for state/territory population, 2001

The weighting method is based on standard procedures for weighting stratified samples using external data sources (Foreman 1991) and follows the same procedure as previous samples. State and territory estimates (ABS 2001) of the 2001 estimated resident population (ERP) within individual ages are used to provide numerators for weights that are divided by the age-specific number of cases in the samples from respective states and territories. Hence, observations from more populous states achieve relatively greater weight. The stratum-specific weights are further divided by the national ERP and total sample size to achieve numerical equivalence between the weighted sample and the original number of processed records.

Within the states and territories, data were also weighted according to sampling frame, region of sampling or time since last dental examination, this being consistent with statistical analyses presented in state- and territory-specific reports. In 2001 data within Victoria, Queensland, Western Australia, South Australia, Tasmania, the Australian Capital Territory and the Northern Territory were weighted on the basis of area of sampling and sampling fraction so as to give a more representative result for that state or territory. Data within Queensland, Western Australia, Tasmania, the Australian Capital Territory and the Northern Territory were also weighted by time since last dental examination so that children on longer recall intervals, who often have better oral health, were not under-represented in the analysis. Details of these weighting procedures are provided in the relevant state and territory reports.

The weighting protocol aimed to produce estimates that are representative of the population covered by the school dental services for 2001. However, the estimates in this report cannot be applied to children who are not enrolled in the school dental services. Consequently, the results in this report do not represent the complete Australian child population, but only that portion of the population that is enrolled in the school dental services. Enrolment across Australia varies but in all states and territories is higher for primary-aged children than for children in secondary schooling. Hence, in this report, estimates for primary school children may not differ substantially from those that would be obtained if all children in the country were surveyed; however, estimates for secondary school children may vary from those obtained if all children in the country were surveyed.

It is necessary to be cautious in drawing inferences from age-related trends, particularly among those aged over 12 years. In most states and territories, access to school dental services for older children tends to be restricted in comparison with access for younger children. Often the older children must meet special eligibility criteria, with the consequence that they may be less representative of their respective age groups within the Australian population than is the case for younger children. Also, in Victoria and the Australian Capital Territory no children aged older than 14 years are included in the analysis, so current estimates for 15-year-old children do not take that state and territory into account.

Indices of decay experience were calculated from data collected over a 12-month period. Where children received more than one examination during this period, the information derived from examinations other than the first has been excluded. Age-standardised statistics are based on the simple rolling together of data for all relevant age groups.

Analyses of socioeconomic differences in children's oral health use the Socio-Economic Indexes for Areas (SEIFA) Index of Advantage to assign a score to the postcode of residence of each child. SEIFA scores are a composite of a number of items believed to be related to socioeconomic status and derived from the 2001 Australian Census. A higher score on the Index of Relative Socio-Economic Advantage/Disadvantage indicates that an area has attributes such as a relatively high proportion of people with high incomes or a skilled workforce. It also means an area has a low proportion of people with low incomes and relatively few unskilled people in the workforce. Conversely, a low score on the index indicates that an area has a higher proportion of individuals with low incomes, more employees in unskilled occupations, etc.; and a low proportion of people with high incomes or in skilled occupations. Cut-points were created to define four groups of approximately equal numbers. The three cut-points were 935, 970 and 1025. Approximately 95% of index scores are between 800 and 1200. It should be noted that the indexes are ordinal and not interval measures. That is, although the indexes can be used to order areas in terms of disadvantage; there are no meaningful arithmetic relationships between index values.

Exclusion of data from New South Wales and implications for assessing national oral health trends

Due to a lack of representativeness of the New South Wales results in 2001 to the state child population for this year, data from New South Wales are not included in the Child Dental Health Survey, Australia 2001. The implications of this change to national child oral health statistics are significant and, along with other data collection changes in New South Wales, present a challenge when interpreting time series for Australia. Further information on changes in NSW and three series of national time trends for the period 1990–2001 are presented in Appendix A.

Description of national findings

Number in sample and estimated resident population

There were a total of 110,834 children aged between 4 and 15 years reported for the 2001 calendar year. Children aged 3 years or less and 16 years or more were excluded from this sample as the small numbers receiving care in those age groups across Australia result in poor reliability of computed statistics for those ages. Furthermore, these children are outside the main target group of many of the school dental services, and it is likely that they have some special characteristics that make them less representative of their respective age groups within the Australian population.

The effects of the statistical weighting procedure can be appreciated from examining Table 2. The relatively large numbers of reported cases from South Australia received substantially lower weightings compared with other states and territories. Therefore, the weighted numbers of cases, which are used for estimates listed in subsequent tables, represent smaller numbers of children from this jurisdiction. Consequently, the national sample was numerically representative of the relative populations of states and territories, rather than the number of reported cases.

Table 2: Number in sample and estimated resident population (ERP), 2001

State/territory	Processed cases	ERP	Weight	Weighted cases
	n	*n*		*n*
New South Wales	. .	. .	. .	. .
Victoria [(a)]	10,288	646,404	3.35	34,464
Queensland	12,685	621,021	3.06	38,846
Western Australia	15,596	327,290	1.03	16,061
South Australia	56,481	237,144	0.22	12,650
Tasmania	8,442	80,632	0.52	4,359
Australian Capital Territory [(a)]	834	47,518	2.72	2,268
Northern Territory	6,508	40,130	0.34	2,186
Total	**110,834**	**2,000,139**	**1.00**	**110,834**

. . = Not applicable due to exclusion of NSW from 2001 data collection

(a) Excludes 4-year-old and 15-year-old children.

Deciduous teeth

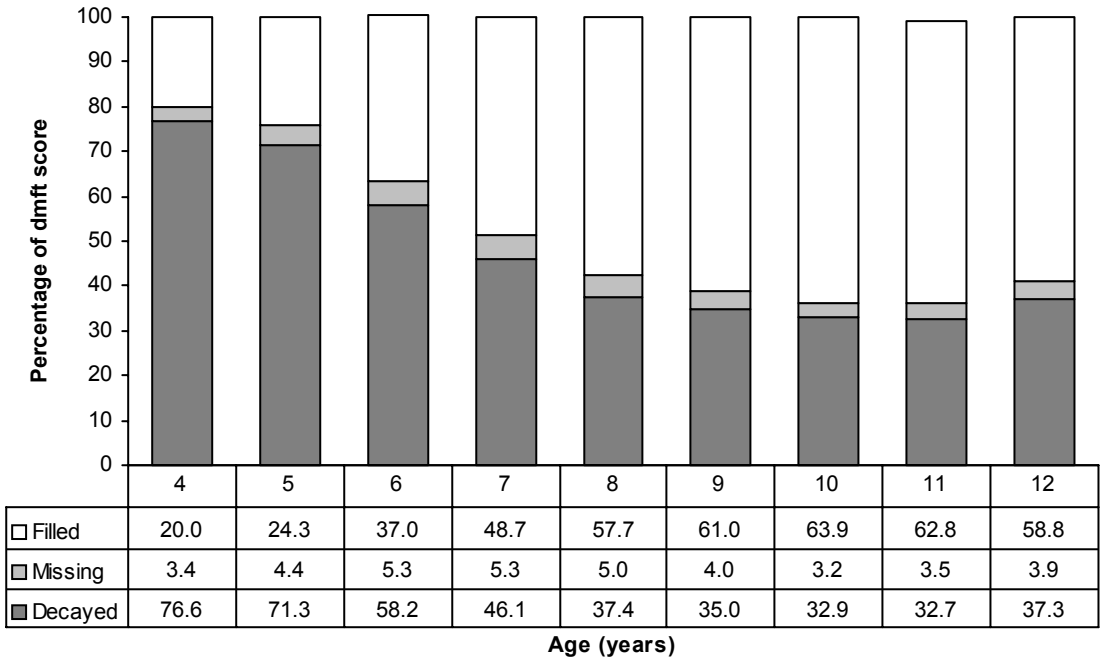
Decay experience in the deciduous teeth is expressed as the average number of decayed, missing (due to decay) and filled teeth. The averages and standard deviations for each of these components for the ages 4–12 years are given in Table 3. There was a steady decline in the presence of clinically detectable decay with increasing age, from 1.34 teeth among 4-year-olds to 0.19 teeth among 12-year-olds. A different pattern was shown by the average number of filled teeth, increasing from 0.35 teeth at age 4 to 1.28 teeth at age 8, before declining rapidly to 0.30 teeth at age 12. Across all age groups the number of teeth indicated as missing due to decay was small, with scores ranging from 0.021 to 0.12 teeth. The average number of decayed, missing (due to decay) and filled teeth (dmft) increased from 1.75 teeth at age 4 to 2.28 teeth to age 7 before declining to 0.51 teeth for 12-year-olds.

Patterns in deciduous decay experience must be interpreted in light of the shedding of deciduous teeth with age. Table 3 shows the steady decline in the average number of deciduous teeth present as children increase in age. From age 5, children shed on average 2 to 3 deciduous teeth per year, reducing the total number from an average of 19.4 teeth at age 5 to 2.2 teeth at age 12.

The decayed, missing and filled components as a percentage of dmft are shown in Figure 2. In the youngest age groups decay experience is composed principally of clinically detectable untreated decay. However, with the accumulation of restorations placed over time, the majority of dmft from the age of 8 years is represented by the presence of fillings. Relative stability in the percentages of decayed, missing and filled teeth occurs between the ages of 9 and 12 years.

Table 3: Deciduous teeth—decayed, missing and filled teeth, 2001

Age (years)	Children	Teeth present	Decayed (d)		Missing (m)		Filled (f)		dmft	
	n	average	average	SD	average	SD	average	SD	average	SD
4	4,053	19.8	1.34	2.48	0.06	0.52	0.35	1.22	1.75	2.94
5	9,242	19.4	1.29	2.42	0.08	0.16	0.44	1.33	1.81	3.06
6	7,960	17.3	1.10	1.97	0.10	0.63	0.70	1.58	1.89	2.88
7	10,299	14.2	1.05	1.84	0.12	0.66	1.11	1.90	2.28	2.99
8	10,329	12.1	0.83	1.46	0.11	0.57	1.28	1.94	2.22	2.73
9	10,457	10.5	0.70	1.26	0.08	0.47	1.22	1.84	2.00	2.51
10	10,685	7.7	0.51	1.04	0.05	0.33	0.99	1.63	1.55	2.18
11	10,682	4.5	0.28	0.81	0.03	0.32	0.54	1.19	0.86	1.66
12	8,161	2.2	0.19	0.64	0.02	0.20	0.30	0.85	0.51	1.26

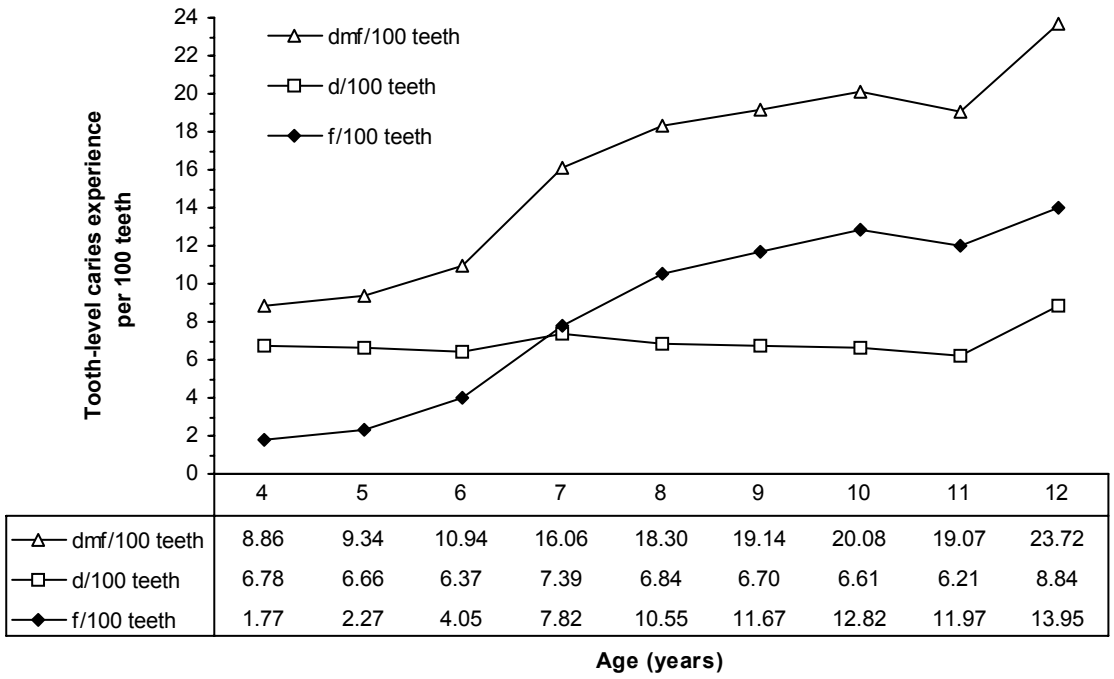


	4	5	6	7	8	9	10	11	12
Filled	20.0	24.3	37.0	48.7	57.7	61.0	63.9	62.8	58.8
Missing	3.4	4.4	5.3	5.3	5.0	4.0	3.2	3.5	3.9
Decayed	76.6	71.3	58.2	46.1	37.4	35.0	32.9	32.7	37.3

Figure 2: Decayed, missing and filled deciduous teeth as a percentage of dmft score by age, 2001

Decay experience, expressed in terms of clinically detectable untreated decay, fillings and the average dmft score, and after controlling for the number of deciduous teeth present, is shown in Figure 3. Although the average number of clinically decayed untreated teeth was shown to decrease consistently with age, the data indicate that this is principally a product of the shedding of deciduous teeth. Indeed, the rate of untreated decay in 2001 remained relatively stable between the ages of 4 and 11, varying from 6.21 per 100 teeth at age 11 to 7.39 per 100 teeth at age 7. The percentage of deciduous teeth with fillings increased with age and together these decay experience indicators combine to produce an increase in the dmft per 100 teeth across age groups. The percentage of deciduous teeth that were decayed, missing or filled increased from 8.9% at age 4 to 23.7% at age 12.

The percentage of children with deciduous decay experience (dmft > 0) steadily increased across the age range 4–8 years, from 42.0% to 57.9%; however, this percentage subsequently decreased, and at 12 years of age only 21.8% of children showed evidence at their examination of decay experience in the deciduous teeth (see Figure 4). This is due to the shedding of deciduous teeth, leading to an increasing percentage of children with no deciduous teeth and therefore no deciduous decay experience. The d/dmft ratio was highest among younger children (80.6%) and declined to 33.8% for children aged 11 years, reflecting the changing distribution of decayed and filled teeth with age.



	4	5	6	7	8	9	10	11	12
dmf/100 teeth	8.86	9.34	10.94	16.06	18.30	19.14	20.08	19.07	23.72
d/100 teeth	6.78	6.66	6.37	7.39	6.84	6.70	6.61	6.21	8.84
f/100 teeth	1.77	2.27	4.05	7.82	10.55	11.67	12.82	11.97	13.95

Age (years)

Figure 3: Tooth-level deciduous decay experience per 100 deciduous teeth by age, 2001

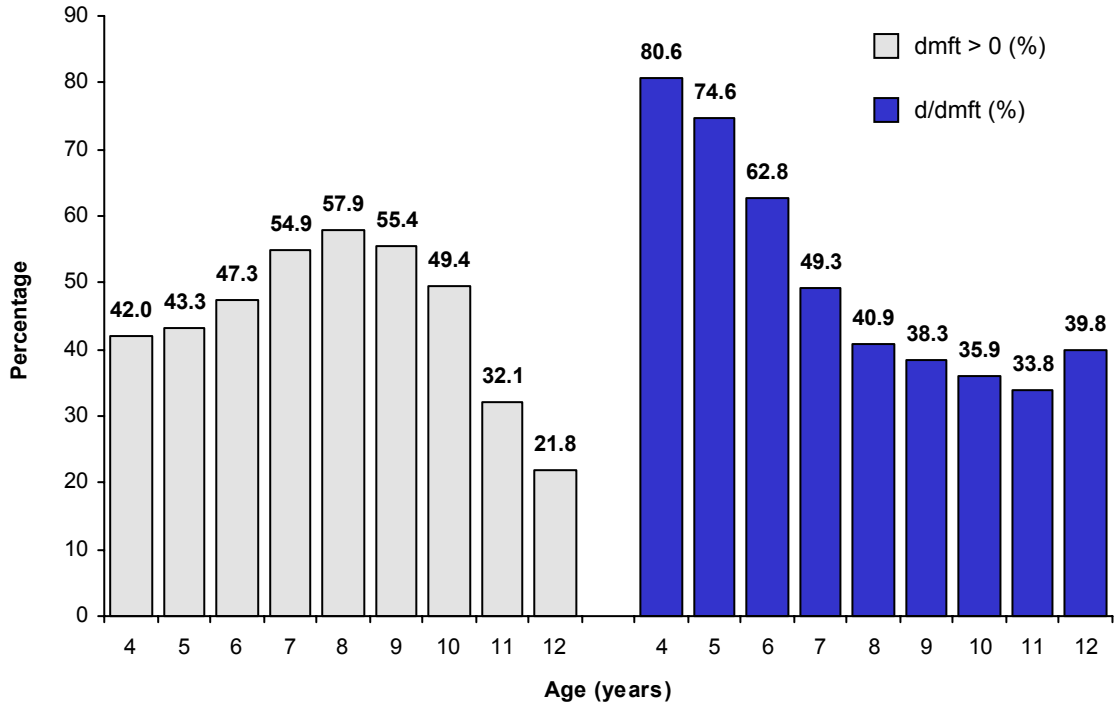


Figure 4: Deciduous teeth – dmft > 0 and d/dmft, 2001

While most Australian children have relatively low deciduous decay experience, there remains a minority of children who experience a considerable decay burden. The distribution of deciduous decay experience by age is shown in Figure 5. As seen in Figure 4, between 42.1% and 58.0% of children between the ages of 4 and 10 years have no clinically detectable deciduous decay experience. Between 9.5% and 13.8% of children in these age groups had a deciduous dmft score of 1, with these percentages increasing slightly with increasing age (Figure 5). The percentage of any age group with between 2 and 4 decayed, missing or filled teeth ranged between about 16% and 25%, while less than 6% of children in any age group had 5 decayed, missing or filled teeth. Children with 6 or more decayed, missing or filled teeth comprised between 7.0% and 16.2% of children in any age group.

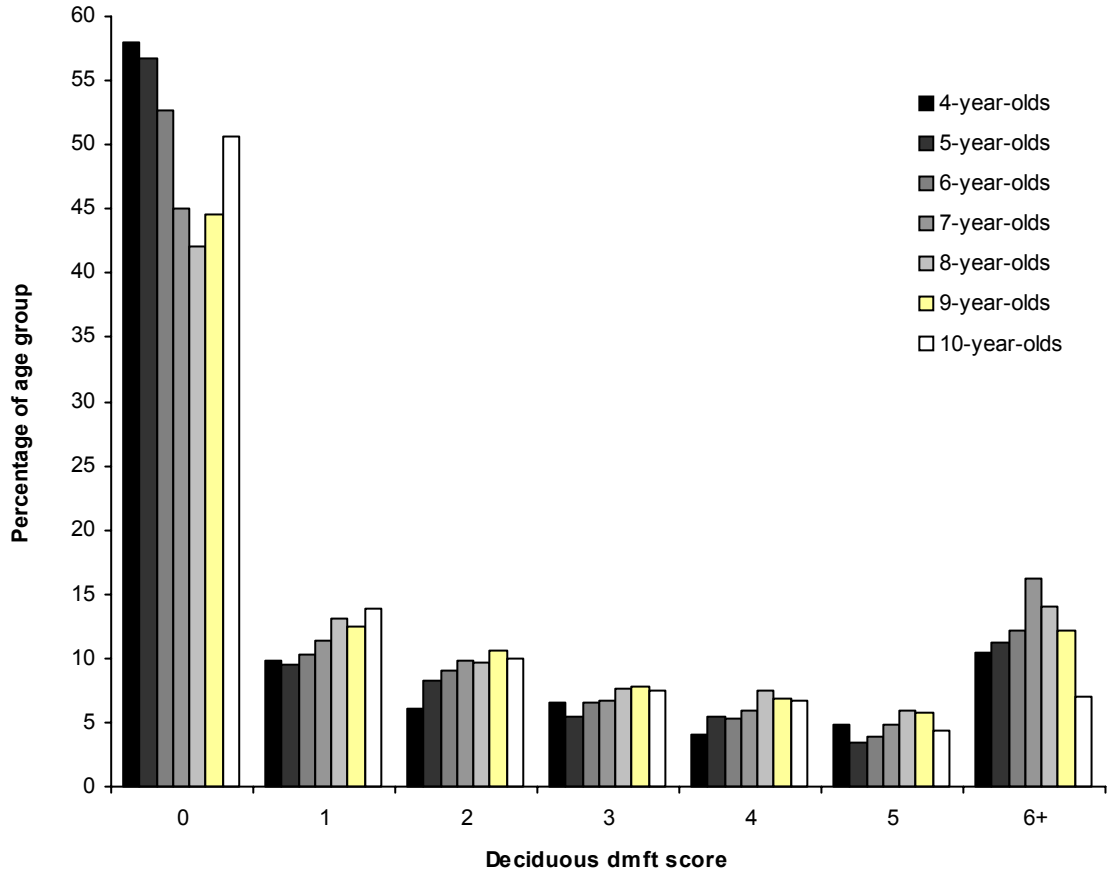


Figure 5: Distribution of deciduous dmft scores by age group, 2001

While average decay experience scores for a population provide good summary statistics they can hide the existence of people within that population who have considerable decay experience. The Significant Caries Index (SiC) was designed to bring attention to those individuals with the highest scores in a population (Bratthal 2001; Nishi et al. 2001). The SiC is the average dmft of the 30% of the population with the highest decay scores. A modified index, the SiC^{10}, is the average dmft of the 10% of children with the highest dmft scores. The SiC and SiC^{10} for the deciduous teeth of 4–10-year-olds are shown in Figure 6. For those children with the highest 30% of scores, dmft scores are considerably higher than the average scores for the entire age group, and range between 4.10 and 5.86 dmft units. The disproportionate burden of disease is dramatically demonstrated for children with the highest 10% of dmft scores, where average dmft ranged from 3.7 (for 8- and 9-year-olds) to over 5 times (for 4- and 5-year-olds) higher than corresponding averages for the entire age group.

The patterns in deciduous decay experience suggest that children enter their school years with moderate decay experience in the deciduous teeth – a large proportion of it manifested as clinically detectable untreated decay (approximately 80% at 4 years of age). With continued treatment in the school dental services, decay experience becomes predominantly represented by past experience, as indicated by the presence of fillings, rather than current experience. Despite steady increases in dmft scores and the accumulation of fillings across the ages 4–10 years, the shedding of teeth results in a reduction in the absolute number of untreated decayed teeth, and increased numbers of children presenting with no deciduous decay experience. The majority of decay experience is represented in a minority of children.

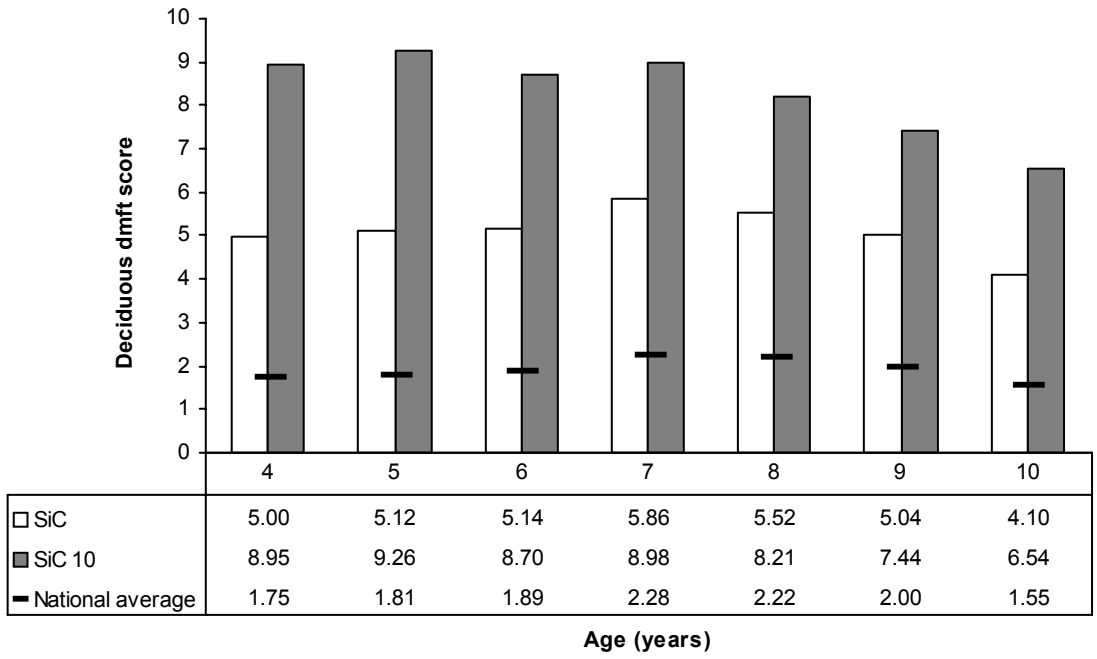


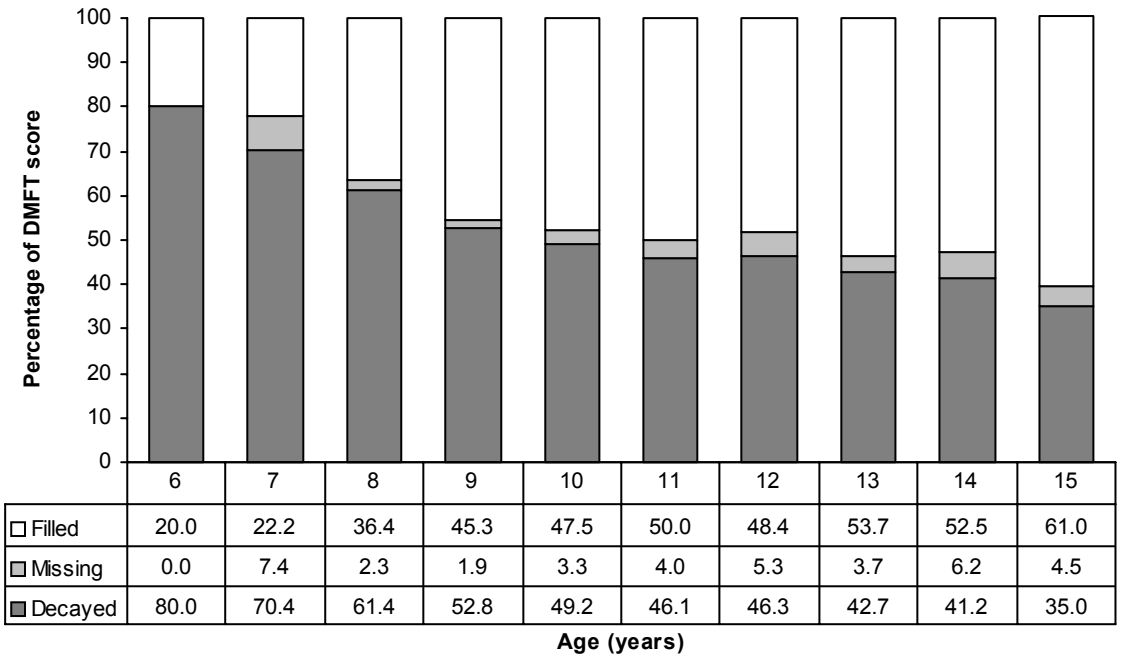
Figure 6: Significant Caries Indices (SiC and SiC^{10}) and average deciduous dmft scores of 4–10-year-old children, 2001

Permanent teeth

The average numbers of clinically detectable untreated decayed permanent teeth were smaller than the corresponding averages for deciduous teeth across the age range 5–10 years (Table 4). This primarily reflects reduced time-at-risk of those teeth present and, at younger ages, the low number of permanent teeth present. The average number of clinically detectable decayed permanent teeth increased consistently with age, peaking at 0.78 for 15-year-olds. The average number of teeth indicated as missing due to decay was very low for most ages but increased slightly to 0.11 teeth for 14-year-old children. The pattern with filled teeth was a consistent increase across the age ranges, from 0.00 for 5-year-olds to 1.36 teeth for 15-year-olds. Average DMFT scores also increased consistently with age, from 0.02 at age 5 (at which time only 1 permanent tooth on average was present) to 2.23 teeth at age 15 (when an average of 27.3 teeth were present). The average DMFT score for 12-year-old children was 0.95 teeth.

Table 4: Permanent teeth—decayed, missing and filled teeth, 2001

Age (years)	Children	Teeth present	Decayed (D)		Missing (M)		Filled (F)		DMFT	
	n	average	average	SD	average	SD	average	SD	average	SD
5	9,242	1.1	0.02	0.27	0.00	0.00	0.00	0.08	0.02	0.29
6	1,960	4.6	0.08	0.40	0.00	0.16	0.02	0.21	0.10	0.52
7	10,299	8.6	0.19	0.62	0.02	0.36	0.06	0.37	0.27	0.82
8	10,329	11.2	0.27	0.70	0.01	0.16	0.16	0.60	0.44	0.97
9	10,457	13.1	0.28	0.69	0.01	0.17	0.24	0.71	0.53	1.06
10	10,685	16.2	0.30	0.80	0.02	0.21	0.29	0.76	0.61	1.19
11	10,682	20.5	0.35	0.89	0.03	0.27	0.38	0.87	0.76	1.35
12	8,161	24.0	0.44	1.00	0.05	0.39	0.46	1.01	0.95	1.58
13	10,447	26.1	0.58	1.27	0.05	0.34	0.73	1.31	1.36	2.04
14	10,982	27.1	0.73	1.55	0.11	0.52	0.93	1.61	1.77	2.49
15	7,539	27.3	0.78	1.52	0.10	0.50	1.36	2.00	2.23	2.80



	6	7	8	9	10	11	12	13	14	15
Filled	20.0	22.2	36.4	45.3	47.5	50.0	48.4	53.7	52.5	61.0
Missing	0.0	7.4	2.3	1.9	3.3	4.0	5.3	3.7	6.2	4.5
Decayed	80.0	70.4	61.4	52.8	49.2	46.1	46.3	42.7	41.2	35.0

Figure 7: Decayed, missing and filled permanent teeth as a percentage of DMFT score by age, 2001

The average number of decayed, missing and filled permanent teeth expressed as percentages of DMFT is shown in Figure 7. The pattern is similar to that shown in the deciduous teeth. In the youngest ages the DMFT score was primarily represented by the presence of clinically detectable untreated decay. By the age of 10 years, however, less than 50% of the DMFT score was attributable to untreated decayed teeth.

Less than 20% of children in each age group 7 years old or less had permanent tooth decay experience (DMFT = 0), and even by the end of their primary school years only 40.3% of 12-year-olds had permanent tooth decay experience (Figure 8). However, by the age of 15 decay prevalence in the permanent teeth was 60.4%.

After controlling for the number of permanent teeth present, an increase in the rate of decay experience could be seen with increasing age, although the trend was not consistent (Figure 9). Between the ages of 8 and 11 years, clinically detectable untreated decay decreased from 2.42 to 1.71 per 100 permanent teeth present, before increasing to 2.86 for 15-year-olds. From the age of 12 years, DMFT per 100 teeth present began to climb sharply, increasing from 4.0% to 8.2% of teeth at age 15.

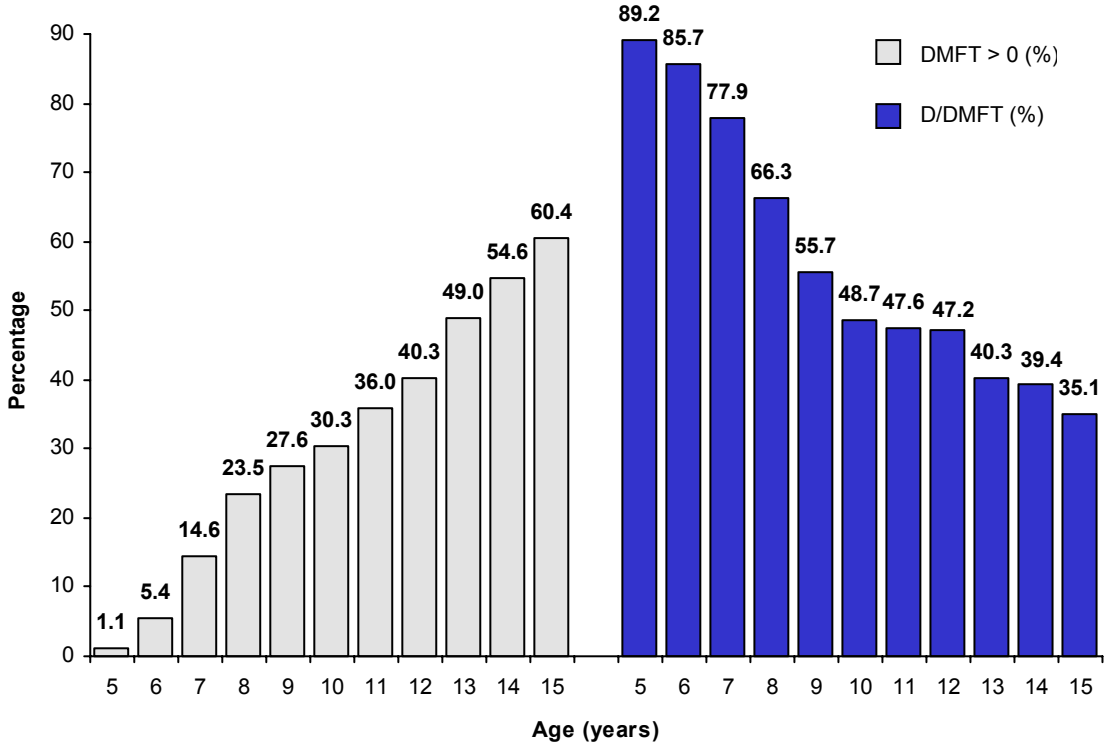
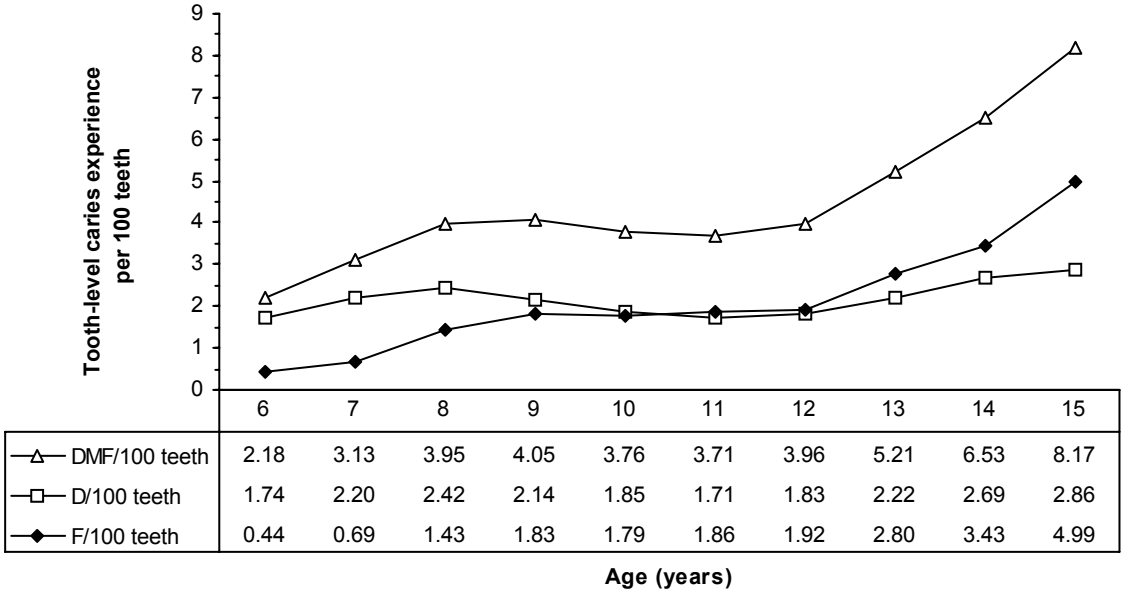


Figure 8: Permanent teeth—DMFT > 0 and D/DMFT, 2001



	6	7	8	9	10	11	12	13	14	15
DMF/100 teeth	2.18	3.13	3.95	4.05	3.76	3.71	3.96	5.21	6.53	8.17
D/100 teeth	1.74	2.20	2.42	2.14	1.85	1.71	1.83	2.22	2.69	2.86
F/100 teeth	0.44	0.69	1.43	1.83	1.79	1.86	1.92	2.80	3.43	4.99

Figure 9: Tooth-level permanent decay experience per 100 permanent teeth by age, 2001

The distribution of permanent DMFT scores for children aged between 6 and 15 years is shown in Figure 10. As seen in Figure 8, there was a consistent decline across the age range 6–15 years in the percentage of children without decay experience in the permanent teeth, as represented by reductions in the percentage of children with DMFT = 0. However, for the other permanent DMFT scores presented, there were generally consistent increases across older ages. Between the ages of 13 and 15 years, 5.1% to 12.9% of children had a DMFT score of 6 or greater.

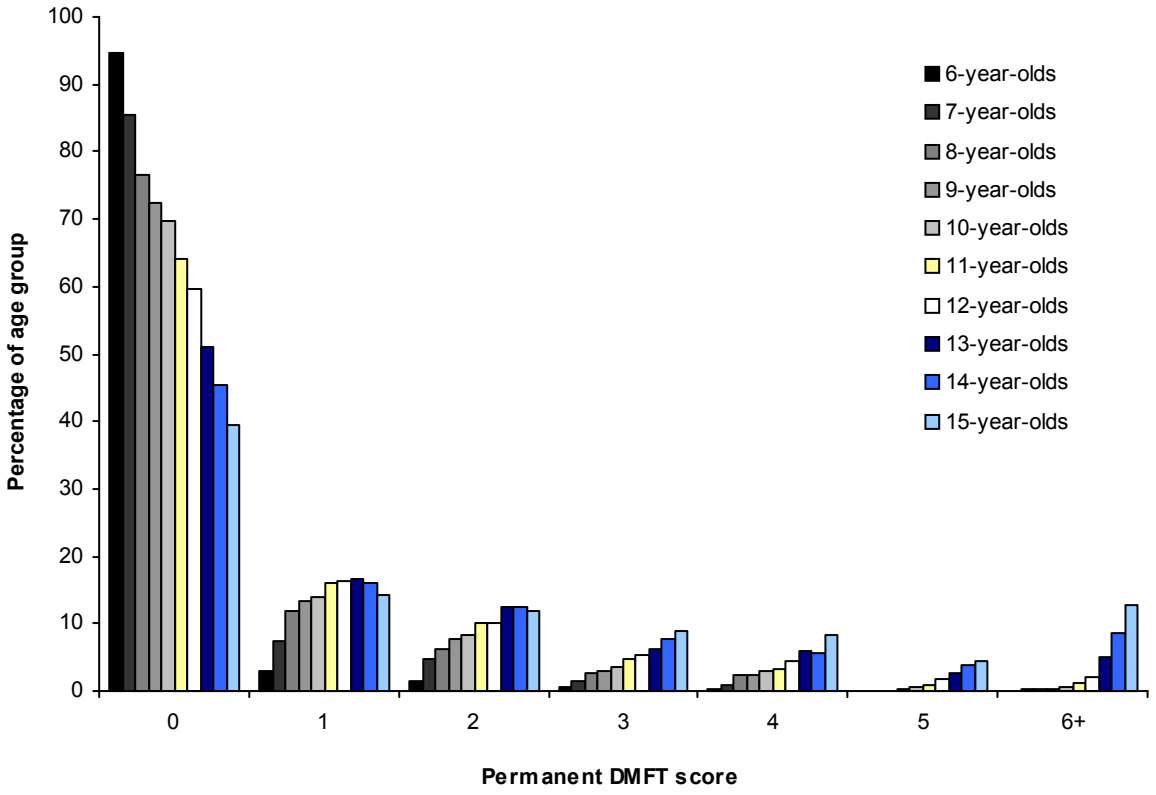
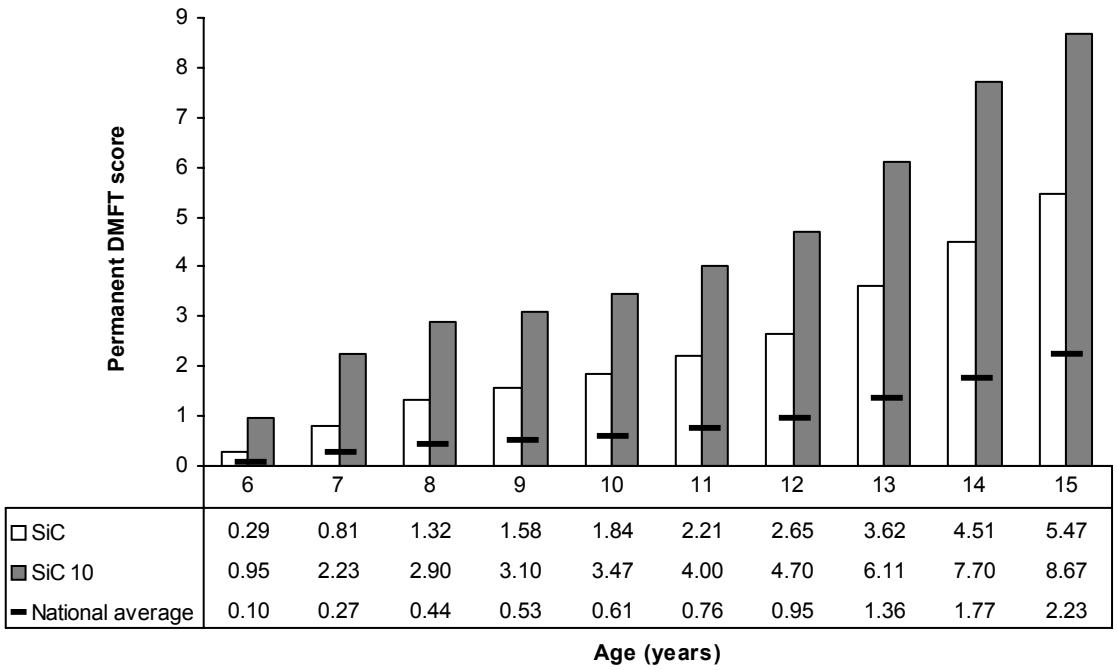


Figure 10: Distribution of permanent DMFT scores by age group, 2001

The burden of disease in the permanent teeth of those children most affected by decay experience is indicated in Figure 11. Although the SiC and SiC[10] are relatively low compared to those in the deciduous teeth, especially in children up to the age of 10 years, it should be remembered that permanent DMFT scores for all children in these age groups was very low, rising to only 0.61 for 10-year-olds. Between the ages of 6 and 10 years, children with the highest 10% of DMFT scores (SiC[10]) had average scores between 5.5 and 9 times higher than average permanent decay experience scores for the corresponding entire age group. Scores for children aged between 11 and 15 years were some 4.5 times (for 15-year-olds) to almost 5.5 times (for 11-year-olds) higher for children with the highest 10% of scores in each age group than the average score for the entire age group. The SiC increased from 0.29 DMFT units for 6-year-olds to 5.47 DMFT units for 15-year-olds, and for each age group ranged from approximately 2.5 to 3 times higher than the average national DMFT.



	6	7	8	9	10	11	12	13	14	15
SiC	0.29	0.81	1.32	1.58	1.84	2.21	2.65	3.62	4.51	5.47
SiC 10	0.95	2.23	2.90	3.10	3.47	4.00	4.70	6.11	7.70	8.67
National average	0.10	0.27	0.44	0.53	0.61	0.76	0.95	1.36	1.77	2.23

Figure 11: Significant Caries Indices (SiC and SiC[10]) and average permanent DMFT scores of 6–15-year-old children, 2001

All teeth

Combined components of decay experience from both the deciduous and permanent teeth are shown in Table 5, providing an indication of the total burden of disease among children receiving care within school dental services.

Untreated clinically detectable decay (d+D ≥ 1) in the combined deciduous and permanent teeth was present for between 30.7% and 44.6% of children in the age range 5–15 years. The highest prevalence of untreated decay was observed among 8-year-olds (where only 55.4% had d+D = 0) while the greatest severity of clinically detectable untreated decay occurred in the youngest ages (e.g. 9.4% of 5-year-olds had 5 or more teeth with clinically detectable untreated decay). Based on observations from previous tables the largest contribution to decay experience among younger children came from deciduous teeth.

Missing teeth due to decay were relatively uncommon among children aged 5–15 years. The percentage of children with no fillings (f+F = 0) and no decay experience (dmft+DMFT = 0) showed a bimodal distribution, driven by changes in decay experience resulting from the shedding of deciduous teeth and the subsequent eruption of the permanent teeth. Among the key age range of 5–12 years, between 36% and 56% of children in any age group had no decay experience in either their deciduous or permanent teeth.

Table 5: All teeth—age-specific decay experience, 2001

Age		d+D =								dmft+
(years)	Children	0	1	2	3	4	5+	m+M = 0	f+F = 0	DMFT = 0
	n	%	%	%	%	%	%	%	%	%
5	9,242	61.9	10.8	8.3	5.4	4.3	9.4	97.4	84.6	56.3
6	7,960	60.4	12.7	9.2	5.9	4.2	7.6	96.1	75.9	51.2
7	10,299	55.7	15.6	10.9	5.8	4.1	7.8	94.2	62.6	41.7
8	10,329	55.4	17.9	11.6	6.2	3.3	5.7	93.9	54.4	36.3
9	10,457	57.4	18.0	11.4	6.1	2.6	4.5	94.7	53.1	36.9
10	10,685	62.0	16.8	10.6	5.2	2.8	2.7	95.7	54.1	38.8
11	10,682	67.9	17.1	7.1	3.8	2.1	2.0	96.8	61.4	46.6
12	8,161	68.2	15.6	8.5	4.4	1.4	1.8	96.1	64.8	47.5
13	10,447	69.3	13.7	8.1	3.8	1.8	3.3	96.6	61.8	46.1
14	10,982	67.1	14.8	8.2	3.9	2.5	3.6	93.8	59.4	43.3
15	7,539	67.3	13.0	8.1	5.5	2.7	3.5	94.7	54.4	39.0

Fissure sealants

The average number of fissure sealants present in permanent teeth increased with increasing age (Table 6), and for all ages exceeded the average number of decayed permanent teeth for each respective age group.

Children aged 7–15 years with permanent decay experience (DMFT ≥ 1) were between 21.6% and 87.6% more likely to have a fissure sealant than children with no permanent decay experience (DMFT = 0). Among the 12-year-old age group, 41.1% of children with DMFT ≥ 1 had fissure sealants compared with 33.8% of those with DMFT = 0. This can be interpreted as a tendency towards the preferential provision of fissure sealants to children deemed to have a greater likelihood of developing dental decay.

Table 6: Fissure sealants—age-specific experience, 2001

Age (years)	Children	Sealants		DMFT = 0		DMFT ≥ 1	
				Children	With fissure sealants	Children	With fissure sealants
	n	average	SD	*n*	%	*n*	%
6	7,956	0.06	0.44	7,526	1.9	429	11.3
7	10,286	0.28	0.91	8,784	8.9	1,502	16.7
8	10,312	0.60	1.26	7,889	20.2	2,424	26.3
9	10,452	0.81	1.41	7,567	26.8	2,884	35.8
10	10,674	0.91	1.48	7,444	30.3	3,230	37.8
11	10,674	0.99	1.52	6,833	32.3	3,841	41.7
12	8,152	1.05	1.65	4,862	33.8	3,290	41.1
13	10,430	1.13	1.85	5,314	31.7	5,116	44.0
14	10,982	1.35	2.25	4,989	27.7	5,993	48.7
15	7,508	1.15	2.05	2,982	26.9	4,526	39.4

Immediate treatment needs

Immediate treatment need was recorded only in Queensland, South Australia, Tasmania and the Northern Territory in 2001. The percentage of children with immediate needs was highest for 5-year-olds (5.6%) and lowest for 13-year-olds (1.8%; Table 7).

Children with immediate treatment needs were found to have greater decay experience in comparison to children judged not to be in immediate need. Age-specific averages for dmft and DMFT tended to be approximately 1.5–3.5 times higher than the national averages listed in previous tables. For example, 5-year-olds with immediate treatment needs had an average dmft of 4.50 (compared with 1.81 in Table 3) and 28.9% had d+D ≥ 5 (compared with 9.4% in Figure 5).

It should be emphasised that the percentage of those deemed to be requiring immediate treatment reflects both the accumulated amount of dental disease and the methods of targeting and delivering school dental services. For example, clinics which provide care for a relatively small proportion of a population and which assign priority to treating those with symptoms will almost certainly record higher percentages of immediate treatment need than other clinics which have universal coverage of all children on a constant recall basis.

Perhaps the most important interpretation of Table 7 is that a subgroup of children with a substantial burden of dental decay could be identified within school dental services. Their state of poor dental health contrasts with the previous observation that between approximately 36% and 56% of 5–14-year-olds have no evident decay experience.

Table 7: Immediate treatment needs—age-specific distribution, 2001

Age (years)	All children	Children in need of immediate treatment										
				dmft		DMFT		d+D =				
								1	2	3	4	5+
	n	*n*	%	average	SD	average	SD	%	%	%	%	%
4	2,762	71	2.6	5.90	4.50	0.00	0.00	13.9	0.8	25.6	24.6	35.1
5	2,964	165	5.6	4.50	4.77	0.08	0.33	18.7	7.1	9.7	8.7	28.9
6	1,566	40	2.5	4.33	3.65	0.18	0.59	20.0	11.6	11.0	8.5	32.5
7	3,777	139	3.7	6.29	3.73	0.59	0.96	20.1	18.0	7.1	1.8	40.1
8	3,826	120	3.1	3.53	2.80	0.84	1.18	20.6	8.6	27.9	6.7	13.8
9	3,935	121	3.1	3.40	3.01	1.47	1.55	44.8	26.4	4.7	2.0	17.5
10	4,003	88	2.2	3.03	2.20	1.78	1.62	29.9	21.6	19.6	2.0	4.4
11	3,918	133	3.4	2.04	2.48	2.98	3.25	20.2	5.2	9.8	10.8	28.4
12	1,561	59	3.8	0.62	1.10	2.33	1.96	21.1	5.8	16.4	30.1	1.5
13	3,796	69	1.8	0.08	0.27	3.93	3.72	24.3	14.8	0.0	1.2	33.8
14	4,354	103	2.4	0.00	0.00	5.47	3.79	30.1	31.1	0.0	17.1	9.5
15	4,416	218	4.9	0.33	1.25	3.65	2.04	4.3	6.6	35.6	2.3	2.2

Interstate comparison—5- to 6-year-old dmft

Combined 5- and 6-year-olds represent a standard age group (cited, for example, within World Health Organization publications); this group is, moreover, a useful one to consider in relation to school dental services since it represents, predominantly, the dental health status of children new to these services.

As shown in Table 8, differences existed among the states and territories between the lowest (Western Australia, average = 1.53) and highest (Queensland, average = 2.24) average dmft scores. Decay scores were lowest in the Australian Capital Territory (average = 0.77) and highest in the Northern Territory, Queensland and Victoria (averages = 1.38, 1.37 and 1.34 respectively). The recorded number of fillings also varied appreciably and was approximately twice as high in Queensland and the Australian Capital Territory (averages = 0.83 and 0.80 respectively) as in Victoria (average = 0.39). In assessing these differences it should be noted that there are historical differences in decay prevalence, as well as marked variations in population density, demography and levels of water fluoridation between these jurisdictions. There are also differences in the organisation and delivery of school dental services between different states and territories.

Variation can also be seen in the percentage of dmft attributable to clinically detectable untreated decay, ranging from a low of 54.2% in the Australian Capital Territory to 77.3% in Victoria (Figure 12). The variation in the percentage of children with no decay experience (dmft = 0), while representing to some degree the converse of average dmft, showed less variation than that for average dmft, ranging from 48.8% in the Northern Territory to 58.6% in Western Australia.

Table 8: Interstate comparison—5- to 6-year-old dmft, 2001

State/ territory	Children	Decayed (d)		Missing (m)		Filled (f)		dmft	
	n	average	SD	average	SD	average	SD	average	SD
NSW	. .	. .	. .	. .	. .	. .	. .	. .	. .
Vic	6,804	1.34	2.35	0.12	0.73	0.39	1.19	1.84	2.99
Qld	4,174	1.37	2.38	0.07	0.49	0.80	1.79	2.24	3.35
WA	2,711	0.98	2.07	0.03	0.34	0.53	1.37	1.53	2.64
SA	2,032	0.84	1.70	0.07	0.60	0.64	1.50	1.55	2.54
Tas	657	1.01	1.96	0.11	0.73	0.53	1.37	1.65	2.78
ACT	462	0.77	1.45	0.09	0.96	0.83	1.79	1.69	2.85
NT	362	1.38	2.32	0.08	0.58	0.54	1.31	2.00	2.92
Australia	**17,201**	**1.20**	**2.22**	**0.06**	**0.62**	**0.56**	**1.46**	**1.85**	**2.98**

. . = Not applicable due to exclusion of NSW from 2001 data collection

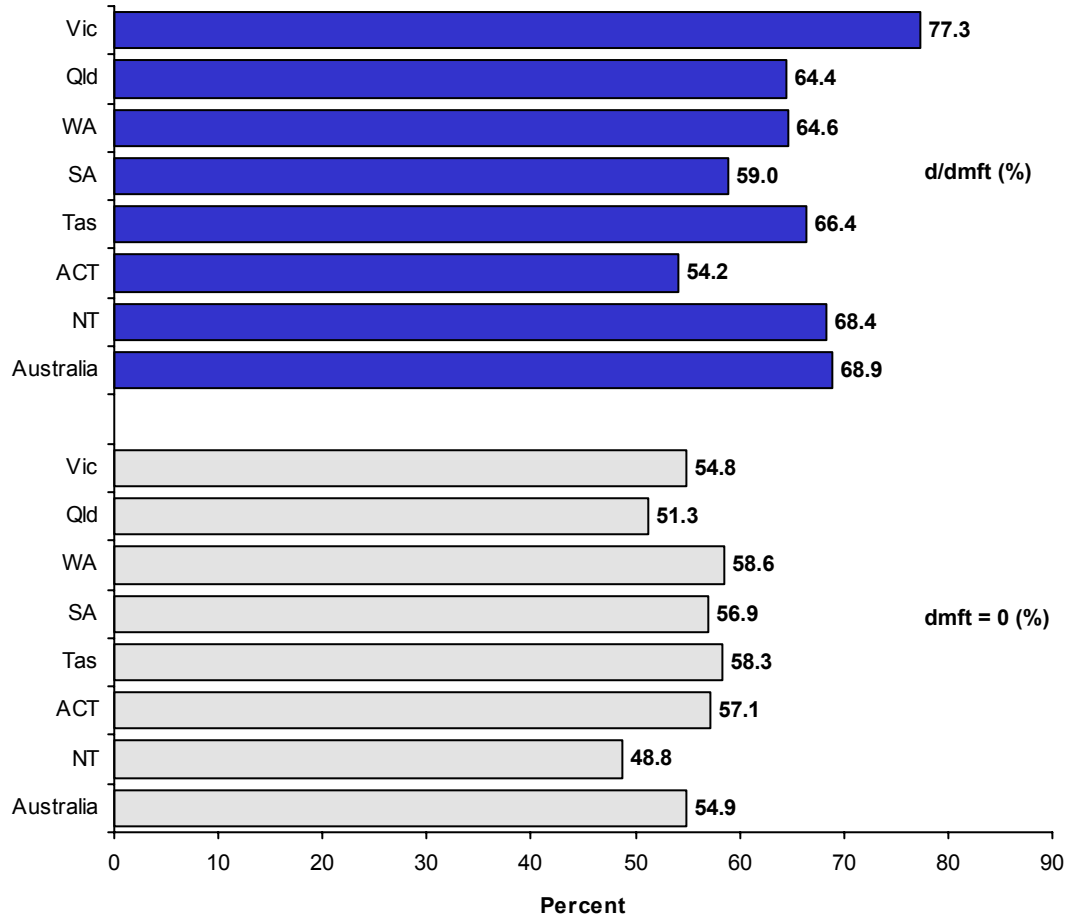


Figure 12: Interstate comparison—5- to 6-year-old d/dmft and dmft = 0, 2001

Interstate comparison—12-year-old DMFT

There was also variation in the average DMFT scores among states and territories (Table 9), with the highest average score (1.38 in the Australian Capital Territory) being about twice that of the lowest (0.67 in South Australia). In the case of permanent teeth, there was again quite a strong correspondence between average DMFT and the average number of decayed teeth, but a weaker correlation between DMFT scores and the average number of filled teeth.

In sharp contrast to the deciduous teeth, the Northern Territory had the highest percentage of children with no decay experience in the permanent teeth, 67% of children with DMFT = 0 (Figure 13). By contrast, Tasmania had the lowest percentage of children with DMFT = 0, with only 49.8% of 12-year-olds in that state presenting without a history of decay experience. There was also quite large variation in the ratio D/DMFT, ranging from 38.5% in Western Australia to 59.2% in the Australian Capital Territory.

Table 9: Interstate comparison—12-year-old DMFT, 2001

State/ territory	Children	Decayed (D)		Missing (M)		Filled (F)		DMFT	
	n	average	SD	average	SD	average	SD	average	SD
NSW	. .	. .	. .	. .	. .	. .	. .	. .	. .
Vic	3,429	0.46	0.99	0.06	0.43	0.41	0.94	0.93	1.53
Qld	1,376	0.52	1.08	0.07	0.43	0.66	1.28	1.25	1.93
WA	1,487	0.32	0.89	0.07	0.38	0.44	0.92	0.82	1.43
SA	1,081	0.25	0.68	0.01	0.20	0.40	0.92	0.67	1.22
Tas	376	0.70	1.26	0.03	0.31	0.54	1.02	1.26	1.75
ACT	222	0.88	1.58	0.02	0.15	0.48	1.09	1.38	1.84
NT	189	0.34	0.88	0.07	0.52	0.32	0.79	0.73	1.33
Australia	**8,161**	**0.44**	**1.00**	**0.05**	**0.39**	**0.46**	**1.01**	**0.95**	**1.58**

. . = Not applicable due to exclusion of NSW from 2001 data collection

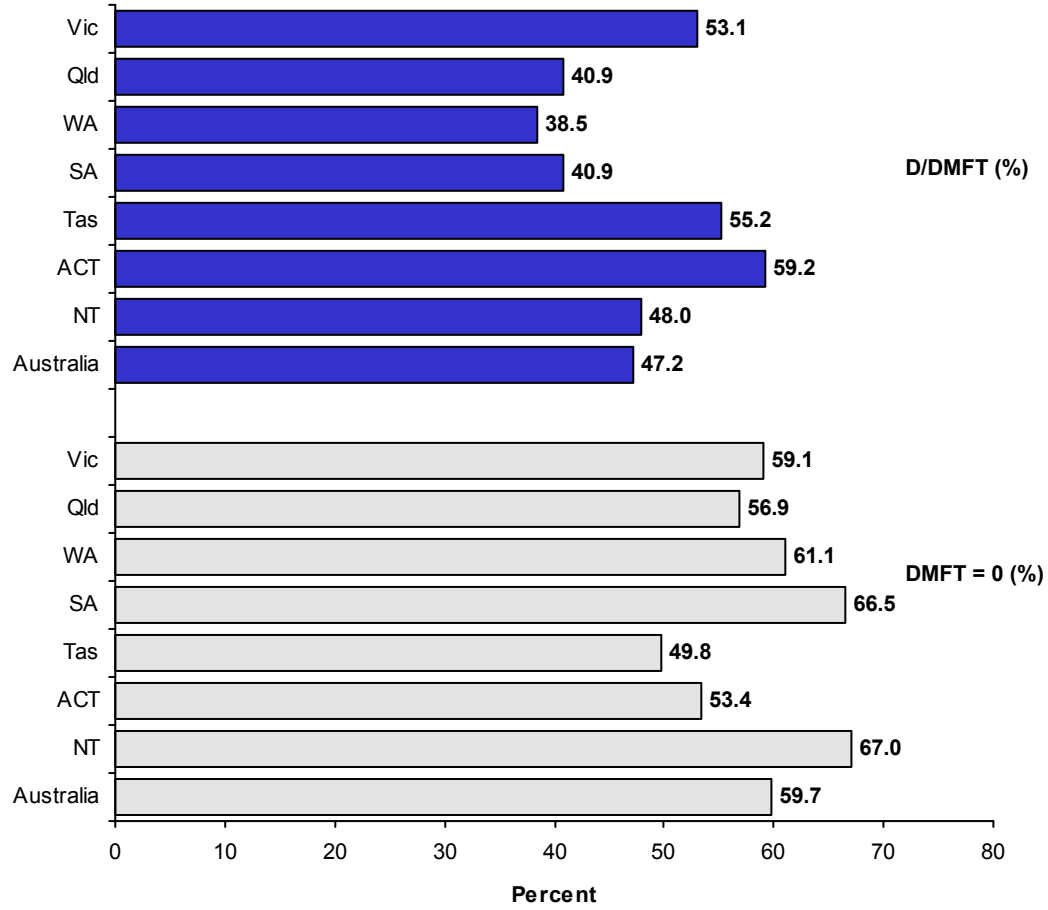


Figure 13: Interstate comparison – 12-year-old D/DMFT and DMFT = 0, 2001

Interstate comparison—all teeth

Age-standardised data were used to bring together data from all ages (children aged between 5 and 12 years) in all jurisdictions for interstate comparison. This is useful in the event that any age-specific statistics (e.g. for 5- to 6-year-olds) provide an unrepresentative picture of conditions in a specific state or territory. The purpose of age-standardisation is to adjust among states and territories for possible differences in the proportion of specific age groups, which is important because of the age-relatedness of most dental decay measures.

Further areas of interstate variation in decay experience are illustrated in Table 10. For example, there are appreciable differences in the percentage of children with 5 or more decayed teeth (d+D ≥ 5). Victoria, the Northern Territory and Queensland have the highest levels of clinically detectable untreated decay (d+D), whereas South Australia and Western Australia have the lowest levels. The percentage of children with no clinically detectable decay experience (dmft+DMFT = 0) was highest in South Australia (48.6%). Consistent with Tables 8 and 9, the lowest percentages of children with no decay experience were found in Queensland (39.9%), the Australian Capital Territory (43.5%), Victoria (44.5%) and Tasmania (44.6%).

Table 10: Interstate comparison—all teeth age-standardised decay experience, 2001

State/ territory	Children	Children with d+D =								dmft+
		0	1	2	3	4	5+	m+M = 0	f+F = 0	DMFT = 0
	n	%	%	%	%	%	%	%	%	%
Vic	27,657	56.4	16.2	10.6	6.0	4.0	6.7	93.4	68.3	43.9
Qld	24,186	60.0	15.6	10.3	5.8	2.9	5.4	95.9	55.9	39.9
WA	11,416	68.2	15.0	7.9	3.7	2.0	3.0	97.5	64.9	48.5
SA	8,377	68.0	15.4	8.0	3.9	2.2	2.5	97.7	63.3	48.6
Tas	2,831	60.0	15.9	10.8	5.7	3.5	4.2	96.9	65.0	44.6
ACT	1,848	63.9	17.3	8.2	5.5	1.8	3.3	99.2	59.6	43.5
NT	1,499	62.8	14.5	8.8	4.8	3.4	5.8	96.2	70.2	47.0
Australia	**77,814**	**60.9**	**15.7**	**9.8**	**5.4**	**3.1**	**5.1**	**95.6**	**63.1**	**43.9**

National summary

Age-standardised data were used to summarise data from all children aged between 5 and 12 years in all jurisdictions (Table 11). Queensland had the highest levels of decay experience for deciduous teeth (average dmft = 1.97, 49.9% dmft = 0), while children in Western Australia had the least decay experience (average dmft = 1.27, 59.1% dmft = 0). The highest levels of permanent decay experience were found in Tasmania (average DMFT = 0.56, 73.4% DMFT = 0) and Queensland (average DMFT = 0.55, 75.3% dmft = 0) while the lowest levels were seen in the Northern Territory (average DMFT = 0.33, 82.8% DMFT = 0) and South Australia (average DMFT = 0.34, 81.8% DMFT = 0).

Table 11: National summary of decay experience of 5- to 12-year-old children, 2001

State/ territory	Children in sample	dmft		dmft = 0	DMFT		DMFT = 0	d+D = 0
	n	average	SD	%	average	SD	%	%
Vic	27,657	1.68	2.60	54.4	0.46	1.04	76.8	56.4
Qld	24,186	1.97	2.80	49.9	0.55	1.22	75.3	60.0
WA	11,416	1.27	2.15	59.1	0.41	1.07	79.1	68.2
SA	8,377	1.39	2.20	57.1	0.34	0.88	81.8	68.0
Tas	2,831	1.43	2.36	58.4	0.56	1.15	73.4	60.0
ACT	1,848	1.43	2.23	53.2	0.43	0.99	77.8	63.9
NT	1,499	1.49	2.40	56.3	0.33	0.89	82.8	62.8
Australia	**77,814**	**1.66**	**2.55**	**54.1**	**0.47**	**1.09**	**77.2**	**60.9**

Socioeconomic differences in children's dental health

Socioeconomic differences in decay experience and fissure sealant provision in Australia in the year 2001 are illustrated in Figures 14–21. These figures allow an insight into the differences between socioeconomic strata of children in a modern low-decay population. Previous research has painted a reasonably consistent picture regarding socioeconomic differences in decay. Most epidemiological surveys have found higher age-specific decay experience in the permanent teeth of people from low socioeconomic backgrounds compared to those from high socioeconomic backgrounds.

Socioeconomic differences in decay experience of deciduous teeth

Differences in the average numbers of decayed, missing and filled teeth, as well as in these components of decay experience combined, are shown in Figures 14 and 15. Across all age groups there is an apparent trend for children from increasingly higher socioeconomic groups to have less deciduous decay experience (Figure 14). Among 5–6-year-olds, the average dmft of children in the lowest socioeconomic group (SEIFA score ≤ 935) was approximately 70% higher than for those in the highest socio-economic group (Figure 15). A socioeconomic gradient existed for all components of the dmft score, with children from increasing lower socioeconomic areas having more decayed, more missing and more filled teeth.

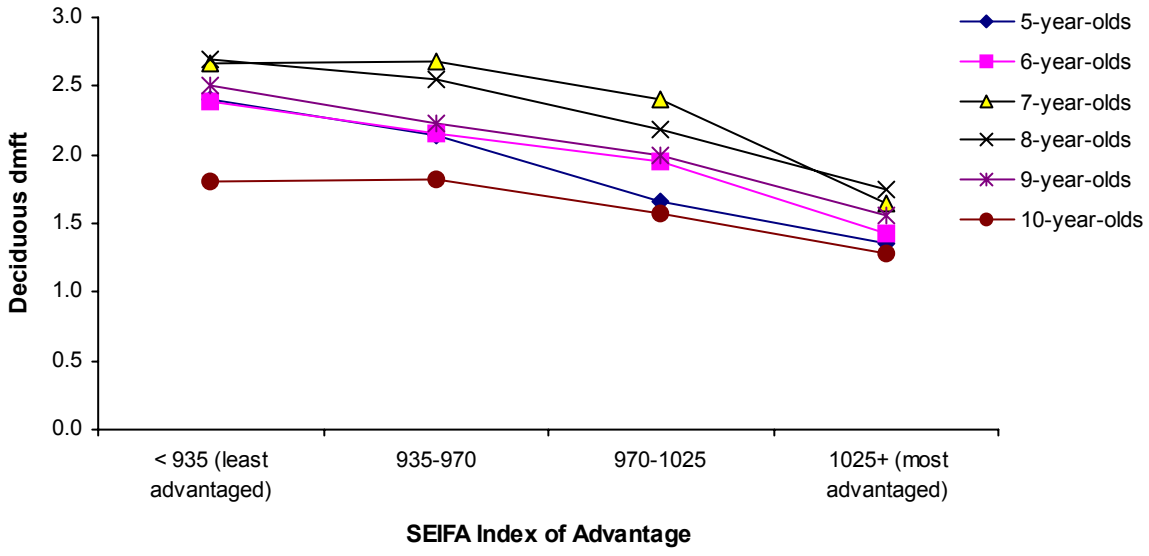


Figure 14: Average deciduous dmft by age and socioeconomic status, 2001

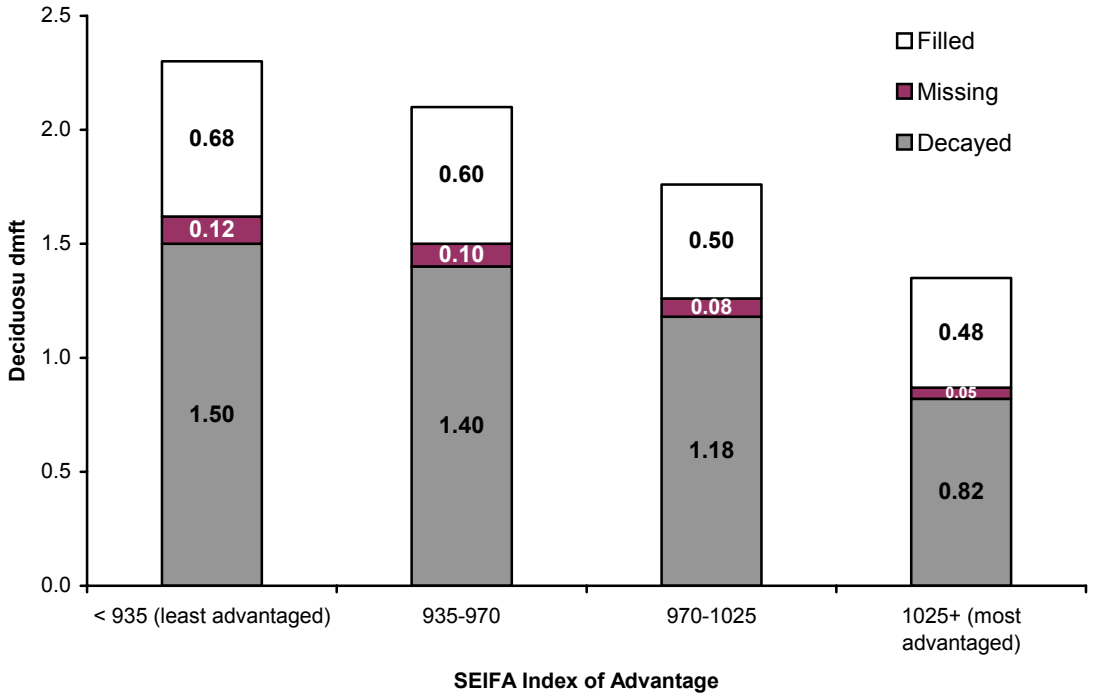


Figure 15: Average number of decayed, missing and filled deciduous teeth for 5–6-year-old children by SEIFA index of advantage, 2001

Socioeconomic differences in decay experience of permanent teeth

At every age except for 11–13-year-olds, children from areas of higher socioeconomic advantage had a lower permanent DMFT than those from areas of lower socioeconomic advantage (Figure 16). These differences ranged from 24.4% for 12-year-olds to 97.1% for 9-year-olds.

Among 12-year-olds, children in the second lowest socioeconomic group had the worst permanent decay experience while those in the highest socioeconomic group had the least decay experience in their permanent teeth (Figure 17). The difference between these two groups was 24.4%. The relationship between the components of the DMFT score and socio-economic status was not as linear as that seen in the deciduous teeth.

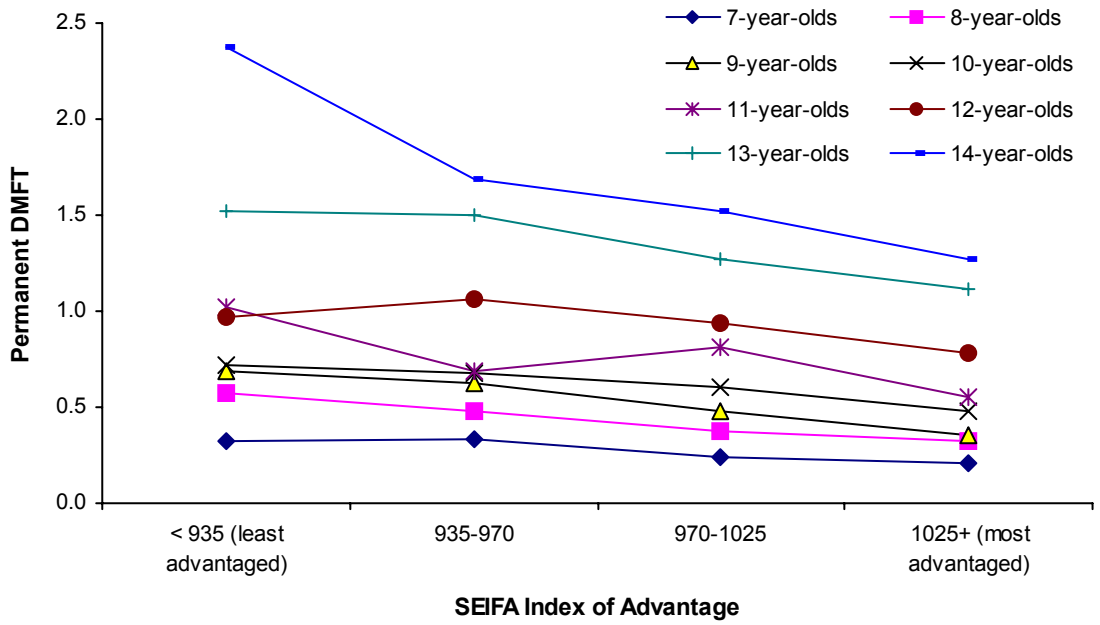


Figure 16: Average permanent DMFT by age and socioeconomic status, 2001

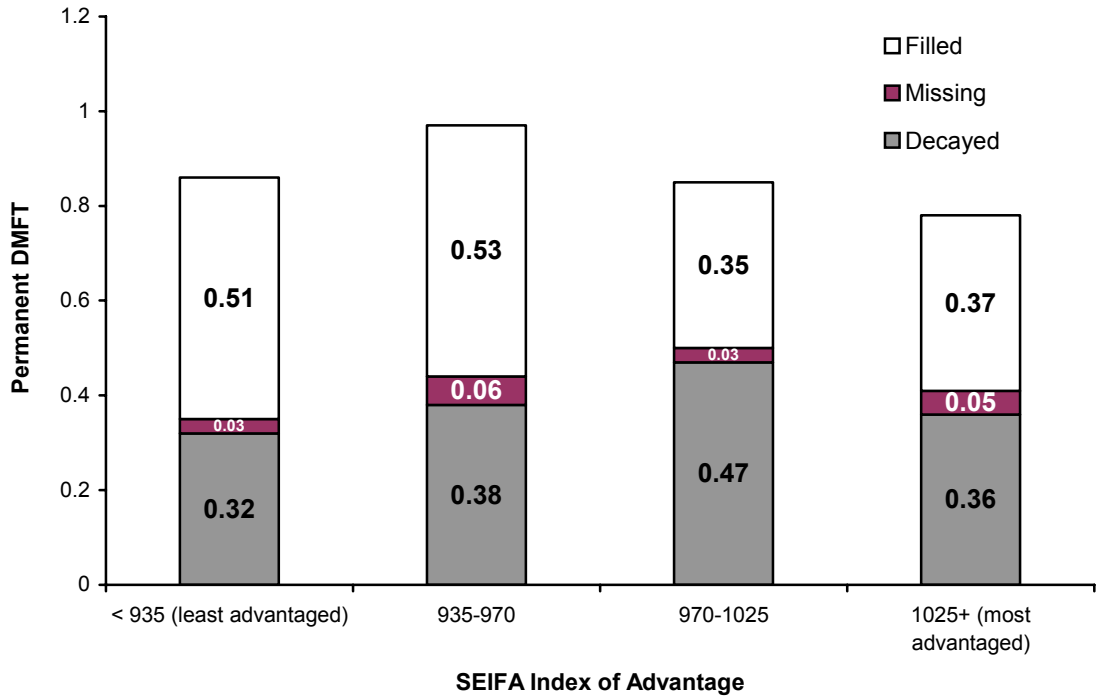


Figure 17: Average number of decayed, missing and filled permanent teeth for 12-year-old children by SEIFA index of advantage, 2001

Socioeconomic differences in decay experience of fissure sealed teeth

The average DMFT of 12-year-old children by the number of fissure sealants present and SEIFA Index of Advantage are shown in Figure 18. For children with no fissure sealants there was a steady gradient in average DMFT, with those from the highest socioeconomic group having approximately 18% fewer decayed, missing or filled permanent teeth than children from the lowest socioeconomic group. Children with between 1 and 3 fissure sealants present all had greater permanent decay experience than those without fissure sealants. This presumably reflects the targeting of fissure sealants towards children with existing decay experience or who are deemed to be at high risk of developing decay. Among children with 1–3 fissure sealed teeth, there was an increase in average DMFT from those residing in the lowest to those in the second lowest socioeconomic areas, followed by a decrease in average DMFT as socioeconomic status increased. The shape of this trend was similar but more extreme for children with 4 or more fissure sealants, where there was an increase approximately 60% between the lowest and second lowest socioeconomic groups followed by declines of approximately 40% across successive socioeconomic categories.

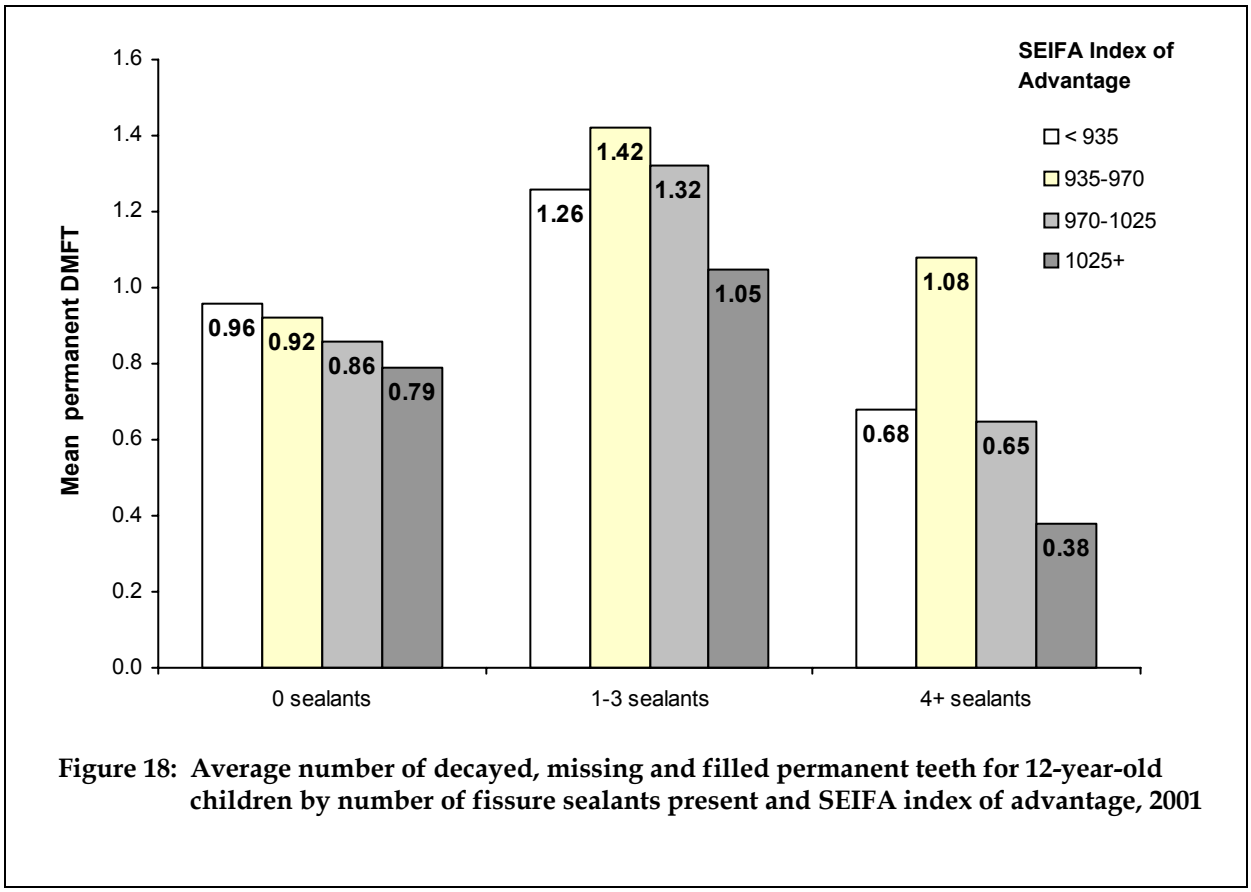


Figure 18: Average number of decayed, missing and filled permanent teeth for 12-year-old children by number of fissure sealants present and SEIFA index of advantage, 2001

Socioeconomic differences in decay experience between children in metropolitan areas and those in rural and remote areas

Using the Rural, Remote and Metropolitan Areas classification (DPIE & DHSH 1994), children were categorised as living either in metropolitan areas or in rural and remote areas. In the deciduous teeth the average number of decayed, missing and filled teeth demonstrated a socioeconomic gradient in both metropolitan and rural and remote areas (Figure 19). In rural and remote areas, however, the shape of the relationship was different to that in metropolitan areas. While a steady reduction can be seen in metropolitan areas across successive SEIFA categories, there are only small decreases in average DMFT for rural and remote children across the lower three SEIFA categories, with a sharp decrease into the highest socioeconomic category.

In the permanent teeth a similar pattern appears to that in the deciduous teeth (Figure 20). However, in metropolitan areas, children in the second lowest SEIFA category had more decayed, missing and filled permanent teeth than did those in the lowest SEIFA category. Permanent 12-year-old decay experience subsequently decreased with increasing socioeconomic status of residence.

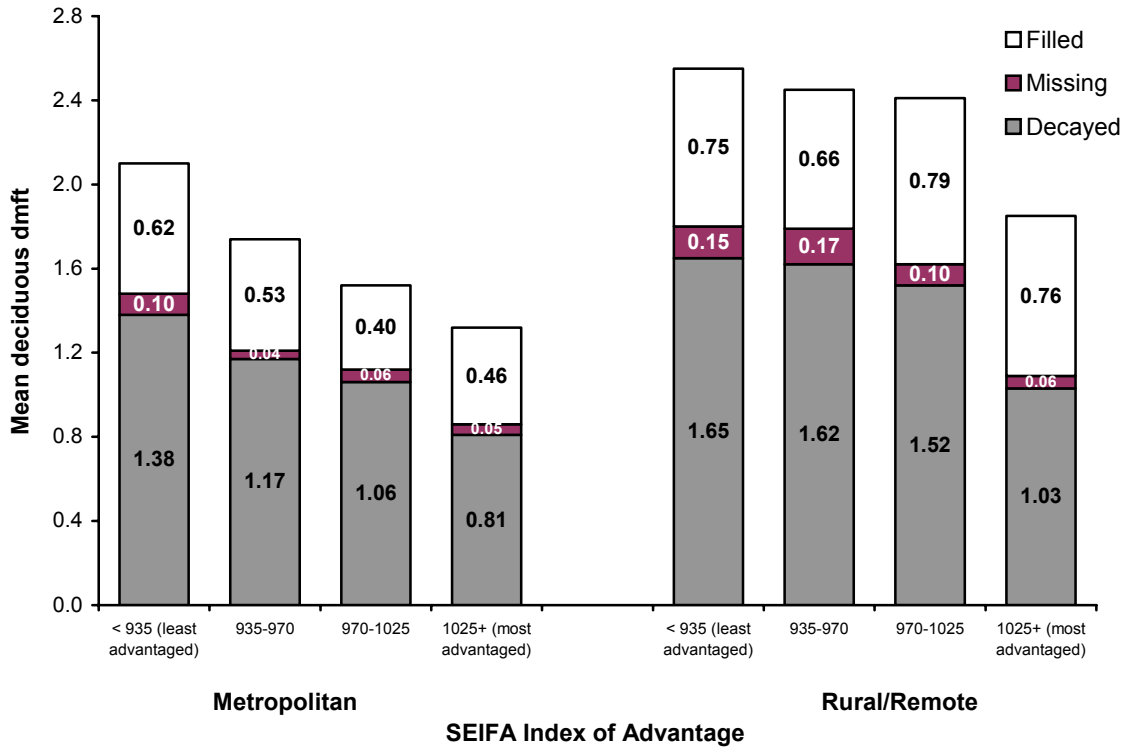


Figure 19: Average number of decayed, missing and filled deciduous teeth for 5–6-year-old children by SEIFA index of advantage and place of residence, 2001

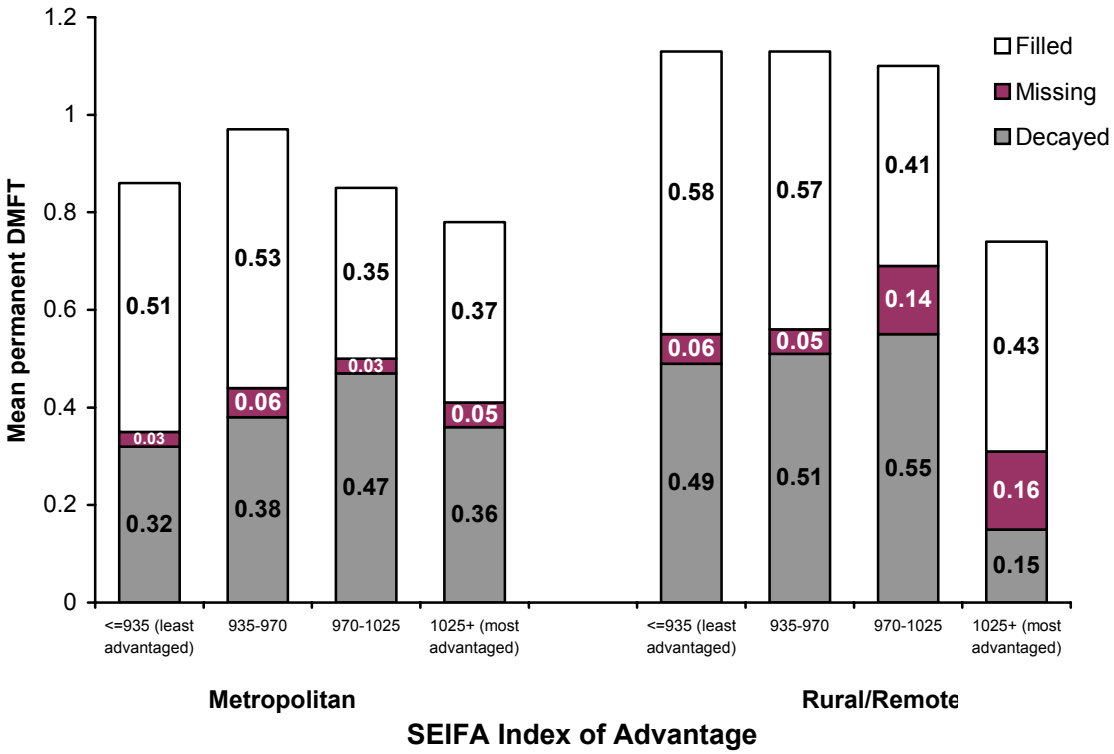


Figure 20: Average number of decayed, missing and filled permanent teeth for 12-year-old children by SEIFA index of advantage and place of residence, 2001

Socioeconomic differences: summary of findings

- At any given age, children from lower socioeconomic areas had more deciduous decay experience than those from higher socioeconomic areas. These differences range between 24% and 97%.
- Permanent decay experience for any age group was lower for children from high socioeconomic areas than for those from low socioeconomic areas, although these relationships were not always linear.
- The relationship between permanent decay experience and socioeconomic status changed depending on the number of fissure sealants children have present.
- Children in rural and remote areas had a substantial reduction in average DMFT only in the most advantaged socioeconomic areas, whereas a consistent reduction in average DMFT was evident from the lowest to highest SEIFA categories for metropolitan children.

International comparisons

Children's oral health has improved in most developed countries and many developing countries over the last quarter of a century. A comparison of 12-year-old DMFT scores from 42 countries and 14 of the 30 OECD nations is presented in Table 12. For comparative purposes, only countries with DMFT data within two years of that presented for Australia have been included. The table shows that Australia has the equal fifth-lowest 12-year-old DMFT score, with only Belize, Hong Kong, The Netherlands and England reported as having lower scores. Of those countries with available data, Australia has the sixth lowest percentage of 12-year-old children with decay experience. It should be noted, though, that Netherlands figures are based only on children from the capital, so the international comparative position of Australia would improve if this country were excluded.

Table 12: DMFT scores and percentage with decay for 12-year-old children by country

Country	Year	DMFT	Rank	% affected	Rank
Belize	1999	0.6	1	n.a.	. .
Hong Kong	2001	0.8	2	37.8	2
Netherlands * [(a)]	2002	0.8	2	32.0	1
England (incl. Wales) *	2000-01	0.9	4	37.9	3
Australia *	**2001**	**1.0**	**5**	**40.3**	**6**
Bangladesh	2001	1.0	5	46.4	9
Haiti	2001	1.0	5	n.a.	. .
Singapore	2002	1.0	5	n.a.	. .
Sweden *	2001	1.0	5	39.0	4
Belgium *	2001	1.1	10	75.0	21
Nepal	2000	1.1	10	41.0	7
Denmark *	2001	1.2	12	39.6	5
Finland *	2000	1.2	12	65.0	15
Germany *	2000	1.2	12	44.7	8
Pakistan	2003	1.4	15	n.a.	. .
El Salvador	2000	1.4	15	n.a.	. .
Norway *	2000	1.5	17	52.0	11
Portugal *	1999	1.5	17	53.0	12
Bahamas	2000	1.6	19	n.a.	. .
Thailand	2001	1.6	19	57.3	14
Israel	2002	1.7	21	53.9	13
South Africa	1999-02	1.9	22	51.0	10
Greece *	2000	2.2	23	72.0	17
Grenada	2000	2.2	23	n.a.	. .
Costa Rica	1999	2.3	25	72.0	17
Japan *	1999	2.4	26	n.a.	. .
Czech Republic *	2002	2.5	27	71.0	16
Morocco	1999	2.5	27	72.0	17
Uruguay	1999	2.5	27	72.5	20

(continued)

Table 12 (continued): DMFT scores and percentage with decay for 12-year-old children by country

Country	Year	DMFT	Rank	% affected	Rank
Kuwait	2000	2.6	30	n.a.	. .
Belarus	2000	2.7	31	n.a.	. .
Macao	2001	2.7	31	75.4	22
Albania	2000	3.0	33	n.a.	. .
Macedonia	1999	3.0	33	95.2	28
Croatia	1999	3.5	35	85.1	25
Lebanon	2000	3.5	35	80.0	23
Paraguay	1999	3.8	37	n.a.	. .
Poland *	2000	3.8	37	88.0	27
Latvia	2001	3.9	37	n.a.	. .
Bulgaria	2000	4.4	40	80.0	23
Gabon	2000	4.4	40	n.a.	. .
Brunei Darussalam	1999	4.8	42	87.1	26

* Member of the Organization for Economic Co-operation and Development (OECD).

(a) Includes only children from The Hague.

Sources: World Health Organization (WHO) Oral Health Country/Area Profile Programme; OECD health data 2001: a comparative analysis of 29 countries.

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Appendix A

In 1996 the New South Wales Health Department (NSW Health), through the school dental service, implemented the Save Our Kids Smiles (SOKS) program, incorporating three main components – oral health education, risk assessment and clinical care. A major change accompanying the program was the move from clinic-based examinations to oral assessments in school classrooms as the primary environment for data collection. In the clinic better lighting and the availability of other facilities such as compressed air optimise conditions for assessing oral health.

Between 1995 and 1996, at the time the SOKS program was introduced, there was an apparent substantial improvement in the oral health of children in New South Wales. There was, for example, a 44% reduction in 5–6-year-old average decay, a 57% reduction in 12-year-old average decay, and a 12% increase in the percentage of 5–6-year-old children free of decay experience (dmft = 0) in their deciduous teeth.

In 2001 New South Wales Health commenced a wide-ranging review of SOKS, with one aspect being a quality assurance project aimed at assessing the reliability and validity of data collected under SOKS assessment conditions. The technical report (New South Wales Health Department 2001) found that, while there were no statistically significant differences in the reporting of missing and filled teeth between a field SOKS-style assessment and a clinical examination, there was a persistent and statistically significant under-reporting of the number of decayed teeth in non-clinical conditions. In deciduous teeth the average number of decayed teeth for the SOKS assessment was 36% lower than that collected in the clinic, while the average number of decayed permanent teeth was 41% lower. This underestimation of decay also resulted in a significant underestimation in the dmft and DMFT indices.

In 2001 child dental services in New South Wales were targeted towards designated 'disadvantaged' primary and secondary schools under the School Assessment Program (SAP). Children were prioritised for treatment using a Child Priority Oral Health Program questionnaire, resulting in much smaller numbers of children being seen by the school dental service. Rather than collect information from all children enrolled in a school dental service, or from screening exams as had been done previously, oral health information on children in 2001 was only captured at the point of examination. This represents a serious and considerable bias to the results of the data collection in New South Wales in 2001 given that data was predominantly only available on children with immediate treatment needs from targeted 'disadvantaged' schools.

Because of the lack of representativeness of the New South Wales results in 2001 to the state child population for this year, data from New South Wales are not included in the Child Dental Health Survey, Australia 2001. The implications of this change to national child oral health statistics are significant. Given that the estimated resident population (ERP) of children in New South Wales makes up approximately one-third of the Australian child ERP, variations in child oral health in New South Wales have appreciable influence on national estimates.

The changes in data collection in New South Wales from 1996 to 2000 under SOKS and then from 2001 onwards under SAP present a challenge when interpreting time series for Australia. Time trends for 6-year-old and 12-year-old children, for the period 1990–2001, are therefore provided using three time series (Figures 21–26). The first series presents results that include unadjusted data for New South Wales during 1996–2000. The second series

presents results with adjustments for the estimated under-reporting of clinically detectable decayed teeth in New South Wales between 1996 and 2000 (derived from a NSW Health review of SOKS). A weighting of 1.56 was used for calculations of decayed deciduous teeth and 1.68 for calculations of decayed permanent teeth in the New South Wales data, resulting in an adjusted national output. The third series presents results with New South Wales data excluded from the national average from 1996 onwards.

In the first time series, a decrease in decay experience is observable after the underreporting associated with SOKS, with a subsequent increase once New South Wales is excluded in 2001. In the deciduous teeth the lowest dmft is seen in 1996 (Figure 21) while in the permanent teeth the lowest point occurs in 1998 (Figure 24). In the third time series, greater stability in the time trend is evident however these results comes at the expense of excluding approximately one-third of the child population of Australia. A small dip in both deciduous and permanent decay experience is evidenced in 2001 (Figures 23 and 26). The second time series consists of a compromise between the first and third series. In the deciduous teeth a decline is shown to 1996 followed by a reasonably steady increase in dmft to 2001 (Figure 22). Series 2 for the permanent teeth shows a decline to about 1998–1999, followed by a slight increase thereafter (Figure 25).

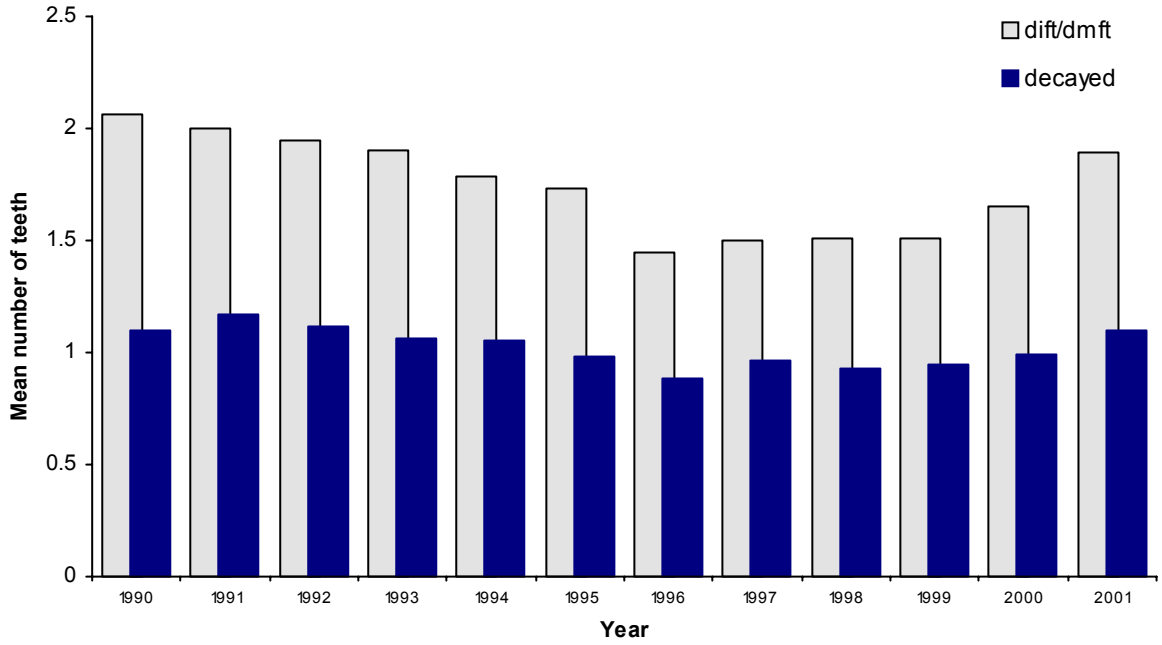

Figure 21: Average dift/dmft and decayed component for 6-year-old children in Australia from 1990 to 2001 (Series 1 - including NSW data up to 2000)

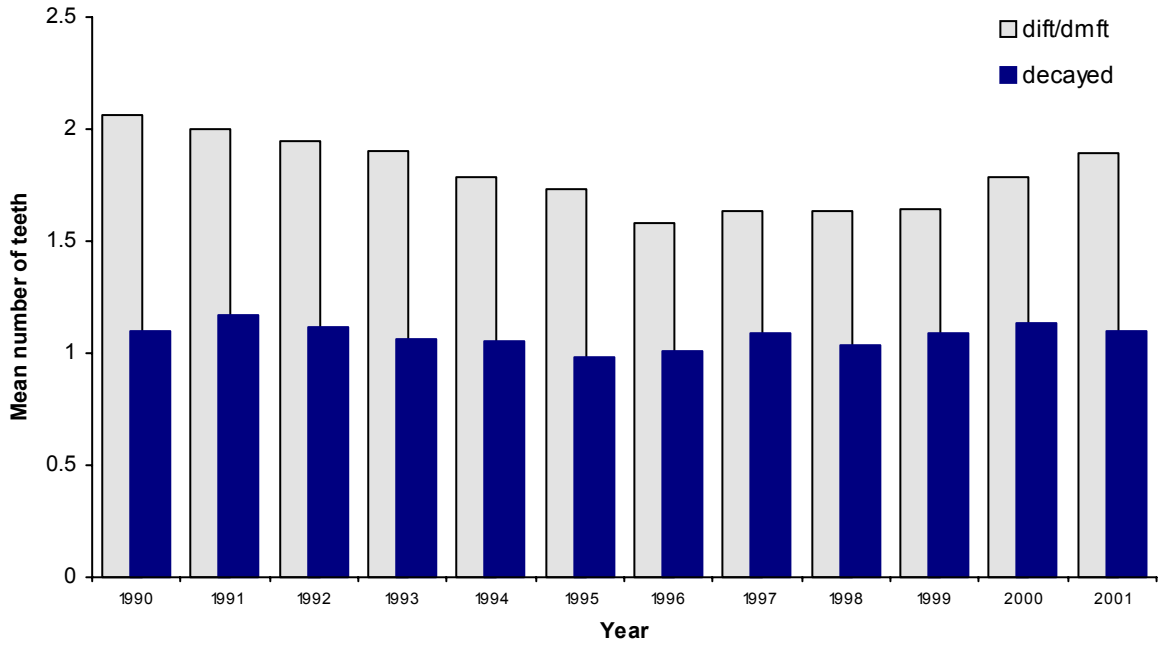

Figure 22: Average dift/dmft and decayed component for 6-year-old children in Australia from 1990 to 2001 (Series 2 - adjusting for NSW data, 1996–2000)

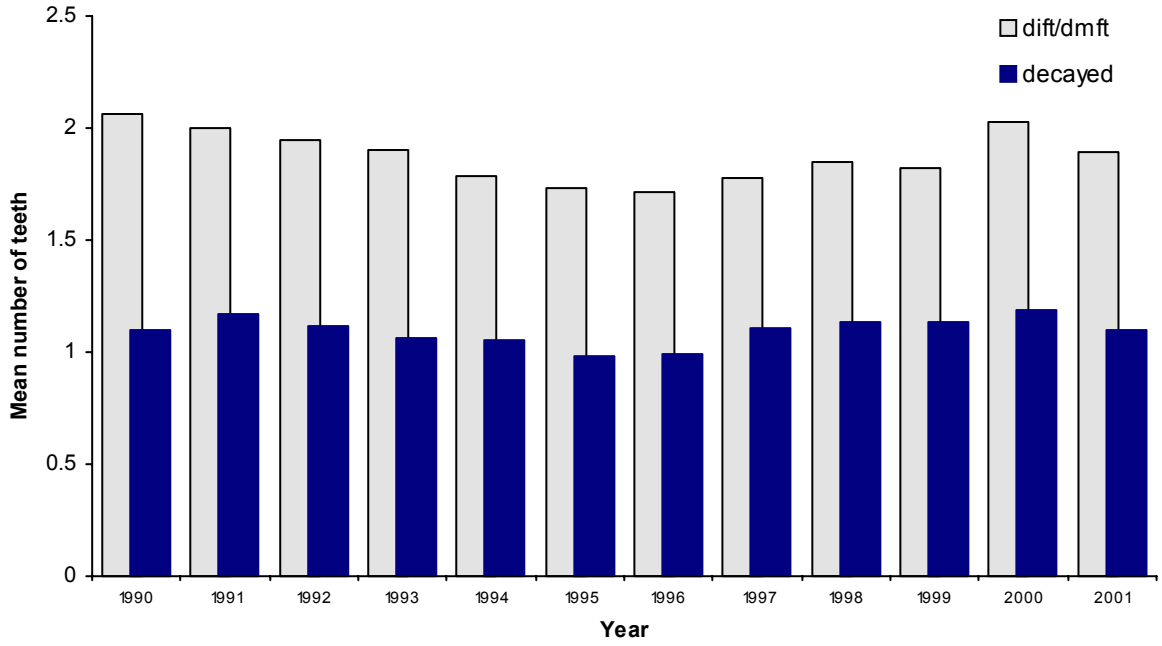

Figure 23: Average dift/dmft and decayed component for 6-year-old children in Australia from 1990 to 2001 (Series 3 - excluding NSW data from 1996–2001)

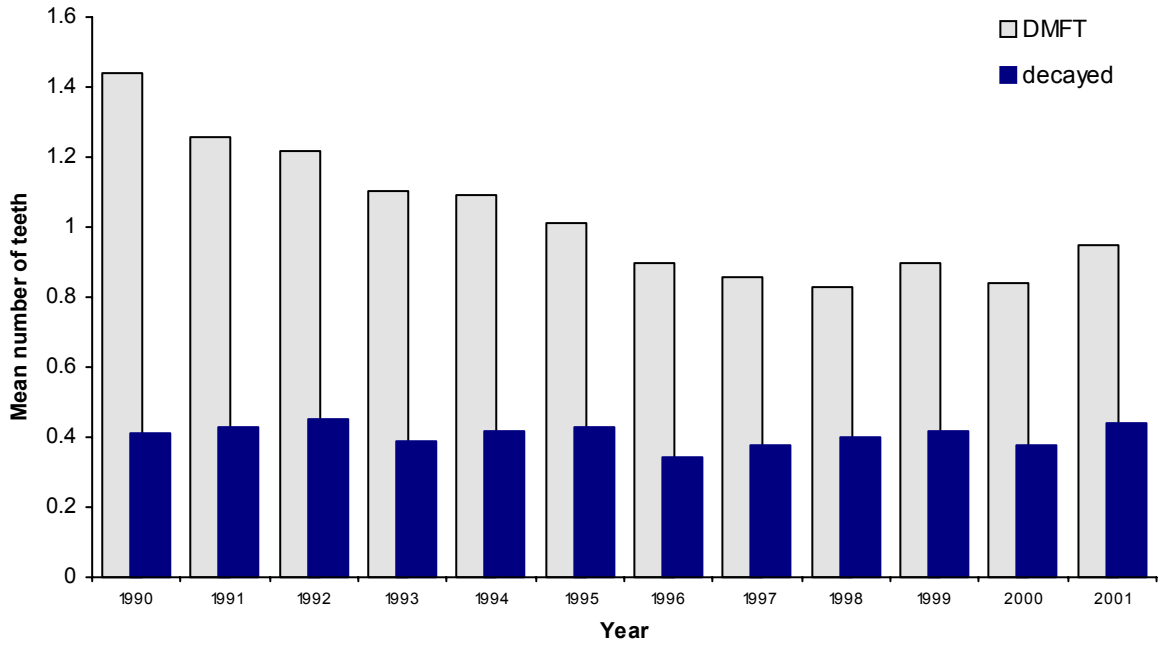

Figure 24: Average DMFT and decayed component for 12-year-old children in Australia from 1990 to 2001 (Series 1 - including NSW data up to 2000)

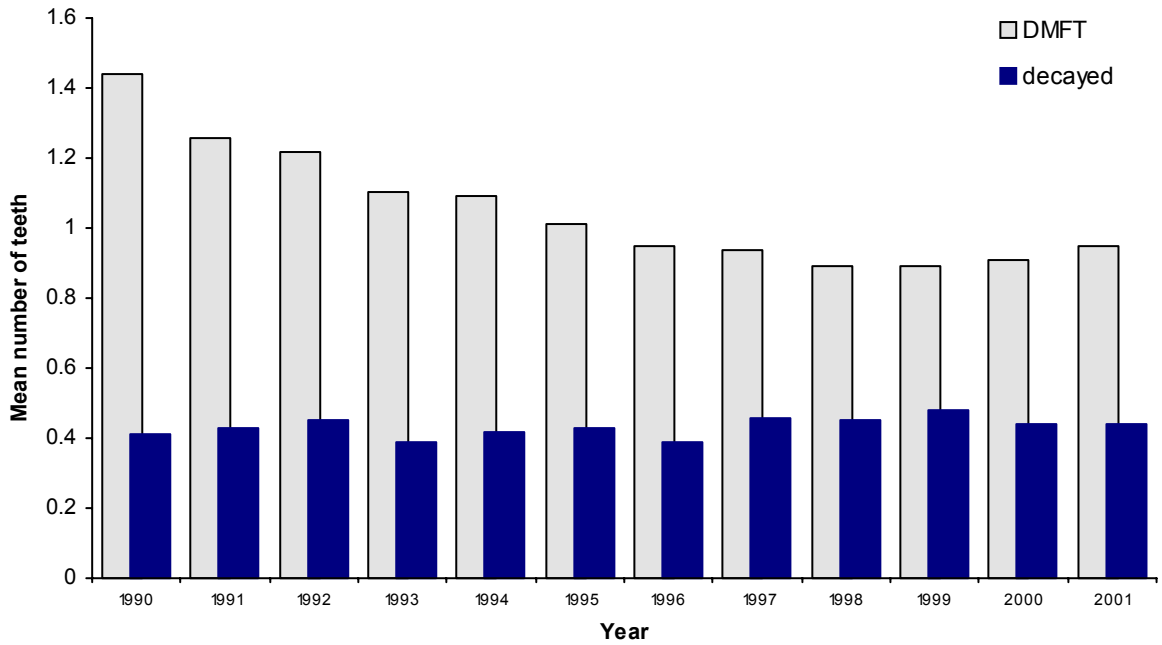

Figure 25: Average DMFT and decayed component for 12-year-old children in Australia from 1990 to 2001 (Series 2 - adjusting for NSW data, 1996–2000)

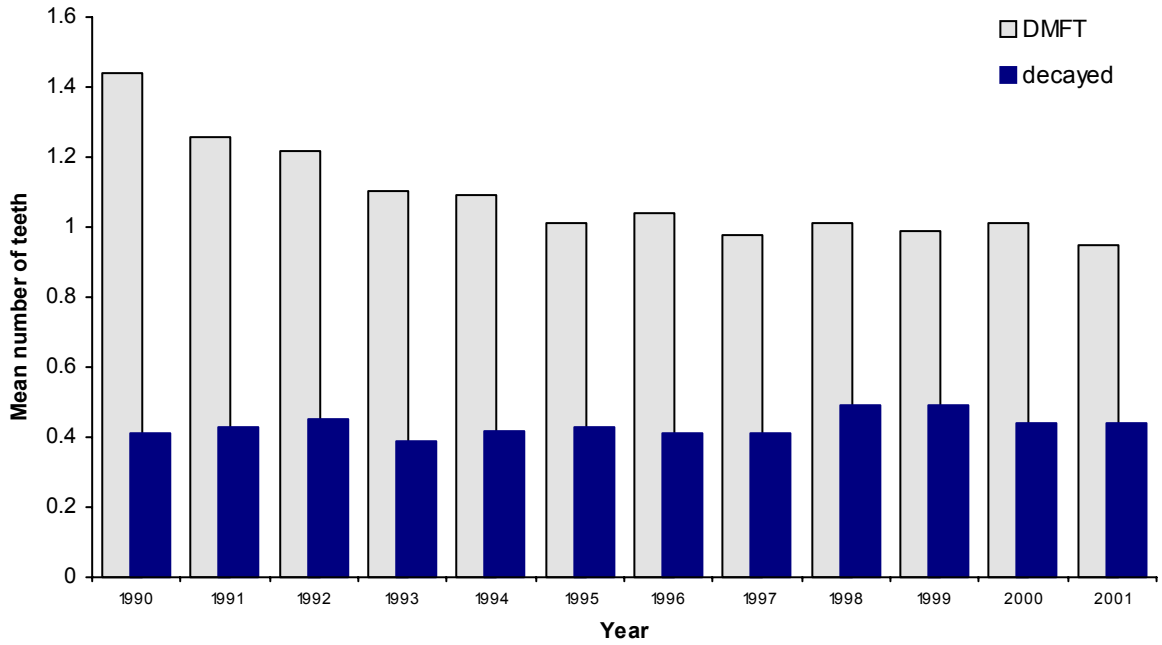

Figure 26: Average DMFT and decayed component for 12-year-old children in Australia from 1990 to 2001 (Series 3 - excluding NSW data from 1996–2001)