

# INTRODUCTION TO ORAL HEALTH

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In New Zealand, District Health Boards fund and provide free dental care for children and adolescents. Pre-school and primary school aged children receive care at Community Oral Health Clinics, many of which are located at schools. There are also mobile clinics which often serve remote and rural areas. There has been consolidation of services in many areas so it is no longer the case that most primary schools have a dental clinic. Young people up to the age of 18 can receive free care from private dentists contracted by the DHB [328].

The Ministry of Health's Early Childhood Oral Health Toolkit [329] notes that, in 2005, 48% of all children had experienced dental caries at five years of age. The toolkit also notes that there are significant inequalities in children's oral health, especially between Māori and non-Māori. Recognising that the risk of dental decay begins as soon as the teeth begin to appear in the mouth (at around six months of age) and that some children experience significant dental caries before the traditional age of enrolment with Child Oral Health Services at 2½ years of age, the toolkit recommends that Well Child/Tamariki Ora and other non-oral health providers undertake a "Lift the Lip" caries risk assessment in all children at between nine and 12 months of age, ensure that all children are enrolled with a dental service by 12 months of age and ensure that the information from the caries risk assessment is sent to the local DHB child oral health services provider. High risk children should have contact with an oral health provider at 12 months of age and all children should have contact by 2½ years of age.

The following section reviews the oral health status of children and young people using information from two separate sources. The first is community Oral Health Service data, which provides information on the proportion of children who were caries-free at 5 years, and the number who had decayed, missing, or filled teeth (DMFT) at 12 years. A separate sub-section considers the proportion of eligible young people accessing publicly funded dental services. The second data source is the National Minimum Dataset, which provides information on hospital admissions for dental caries in children and young people.



# COMMUNITY ORAL HEALTH SERVICES

## Introduction

### Data Sources and Methods

#### Indicators

1. *Proportion of children who were caries-free at age 5 years*

Numerator: Number of children aged 5 years whose deciduous teeth were caries-free on completion of treatment with an oral health service.

Denominator: Total number of 5 year olds who were examined in the year

2. *Mean number of decayed, missing or filled teeth (DMFT) at age 12 years*

Numerator: Number of permanent teeth of children aged around 12 years that are decayed, missing (due to caries) or filled on completion of treatment in Year 8, prior to leaving the oral health service

Denominator: Total number of Year 8 children who were examined in the year

3. *Proportion of adolescents using publicly funded dental services*

Numerator: Total number of adolescents (13–18 years) using publicly funded dental services

Denominator: Total number of eligible adolescents (13–18 years)

#### Notes on Interpretation

Note 1: The data in this section was obtained from <http://www.health.govt.nz/nz-health-statistics/health-statistics-and-data-sets/oral-health-data-and-stats>. The Ministry of Health collates this information from the oral health services. From 2010, information was provided by community oral health services, which replaced school dental services. Once children are enrolled with an oral health service they are seen, assessed and have appropriate treatment prescribed. Upon completion of treatment, dental health status data are collected on 5 year-olds and children in Year 8 (aged approximately 12 years).

Note 2: In this section, fluoridation status refers to the water supply of the service which the student attended, rather than the fluoridation status of the area in which they resided.

Note 3: Southern DHB data were not reported for 1 Jan to 20 Feb 2012, and fluoridation status was not captured for most children throughout 2012, due to transition to a new data system. Southern DHB data for 21 Feb to 31 Dec 2012

Note 4: Tests of statistical significance have not been applied to the data in this section, and thus any associations described do not imply statistical significance or non-significance.

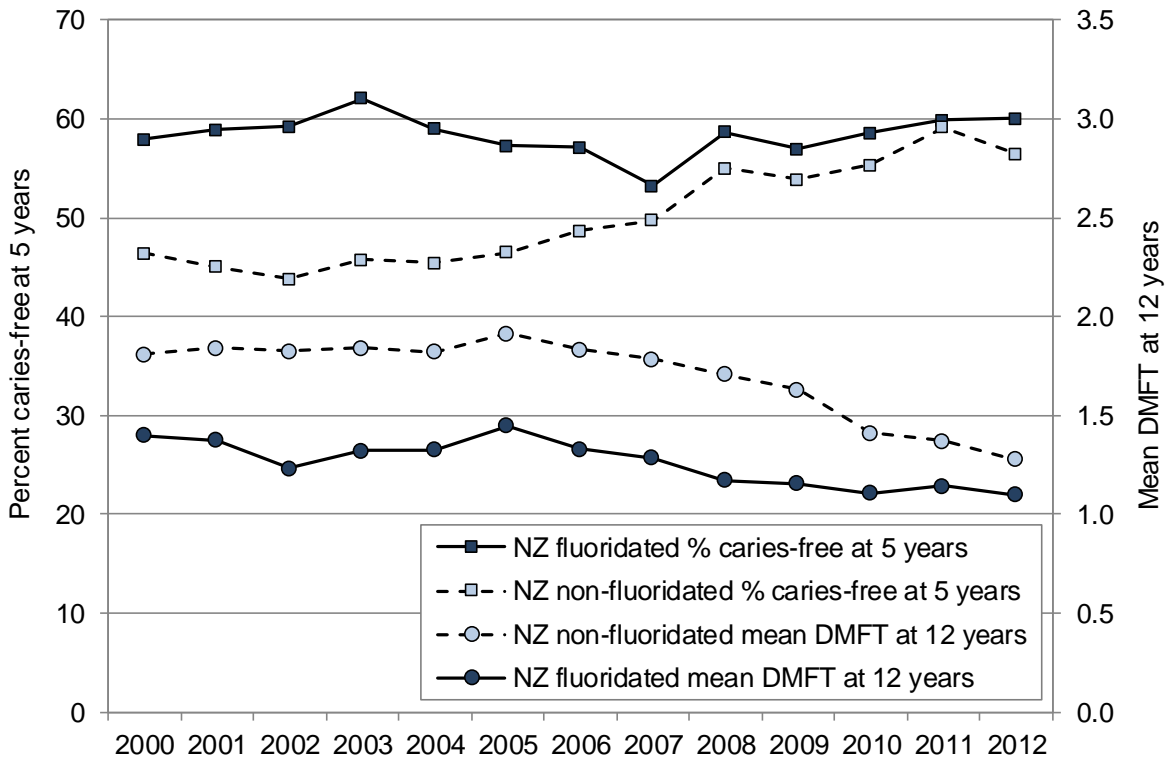
## New Zealand Distribution and Trends

### New Zealand Trends

In New Zealand from 2000 to 2012, the percentage of children who were caries-free at age 5 years was consistently higher in areas with fluoridated water supplies. Children aged 12 years in areas with non-fluoridated water supplies had higher mean scores for the number of decayed, missing or filled teeth (DMFT) than the mean DMFT scores for children in areas with fluoridated water supplies (**Figure 1**).



Figure 1. Percentage of children who were caries-free at age 5 years and mean scores for the number of decayed, missing or filled permanent teeth (DMFT) at age 12 years, New Zealand 2000–2012



Source: Ministry of Health

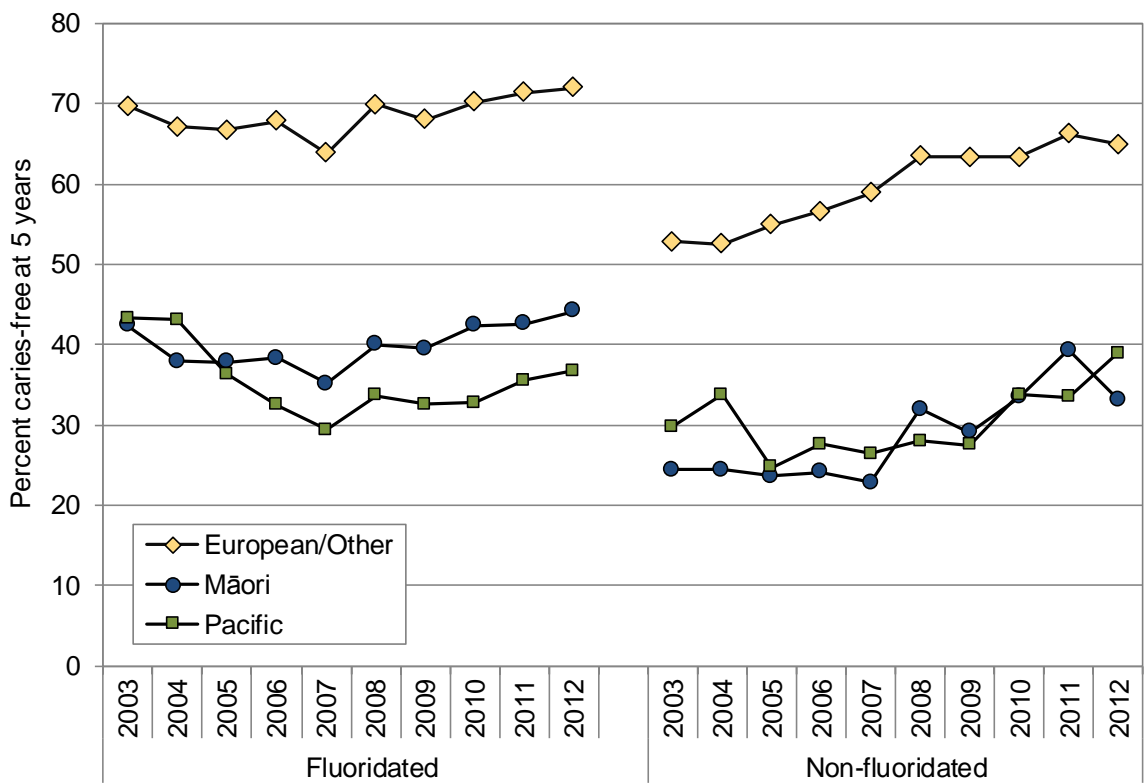
### New Zealand Distribution by Ethnicity

In New Zealand from 2003 to 2012, a higher proportion of European/Other children, compared with Māori or Pacific children were caries-free at age 5 years. For European/Other and Māori children, the proportion that were caries-free was higher in areas with fluoridated water supplies from 2003 to 2012, while for Pacific children the proportion was higher from 2003 to 2009 (Figure 2).

In New Zealand from 2003 to 2012, mean DMFT scores at age 12 years were higher for Māori and Pacific children compared with European/Other children. For each ethnic group, mean DMFT scores were higher for children in areas with non-fluoridated water supplies (Figure 3).

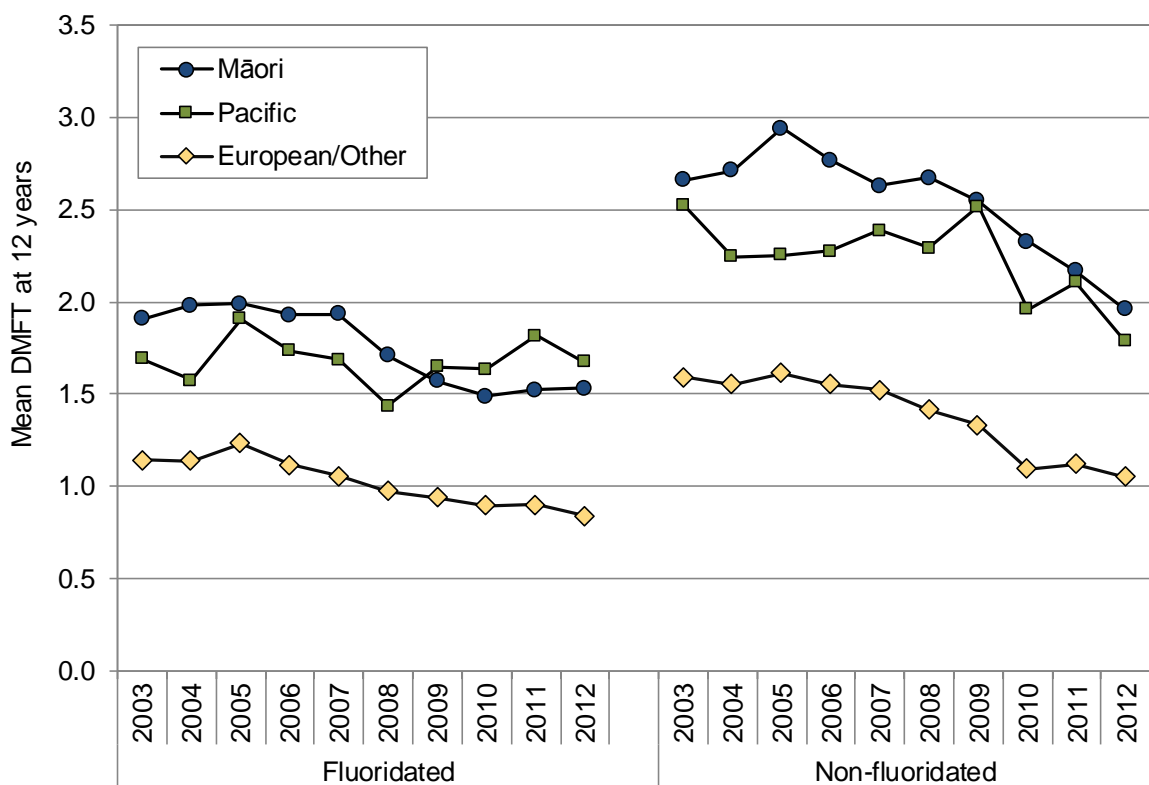


Figure 2. Percentage of children who were caries-free at age 5 years by ethnicity, New Zealand 2003–2012



Source: Ministry of Health

Figure 3. Mean scores for the number of decayed, missing or filled permanent teeth (DMFT) at age 12 years by ethnicity, New Zealand 2003–2012



Source: Ministry of Health



## South Island DHBs Distribution and Trends

In Canterbury during 2012, 1.0% of 5 year olds examined by the oral health service had access to fluoridated water. While none of the 5 year olds examined by the oral health service had access to fluoridated water in Nelson Marlborough, South Canterbury, and the West Coast. This proportion is based on the fluoridation status of the services' water supply, rather than the residential area in which the children live.

Note for Southern DHB, while 48.8% of the 5 year olds examined in 2011 had access to fluoridated water, the fluoridation status was not captured for most children throughout 2012, due to transition to a new data system.

### South Island DHBs Trends

#### Proportion caries-free at age 5 years

In the South Island DHBs during 2000–2012, while there was year to year volatility, the proportion of children who were caries-free at age 5 years exhibited a general upward trend. Rates in both fluoridated and non-fluoridated areas were generally similar/higher than their respective New Zealand rates (**Figure 4**).

#### Mean scores for the number of decayed, missing or filled permanent teeth (Mean DMFT) at age 12 years

In Southern DHB during 2000–2012, mean DMFT scores at age 12 years were consistently higher than the New Zealand rate in both fluoridated and non-fluoridated areas, while in Canterbury rates were higher than the New Zealand rate for the majority of this period. Differences in the remaining Southland Island DHBs were similar to the New Zealand rate (**Figure 5**).

### South Island DHBs Distribution by Ethnicity

#### Proportion caries-free at age 5 years

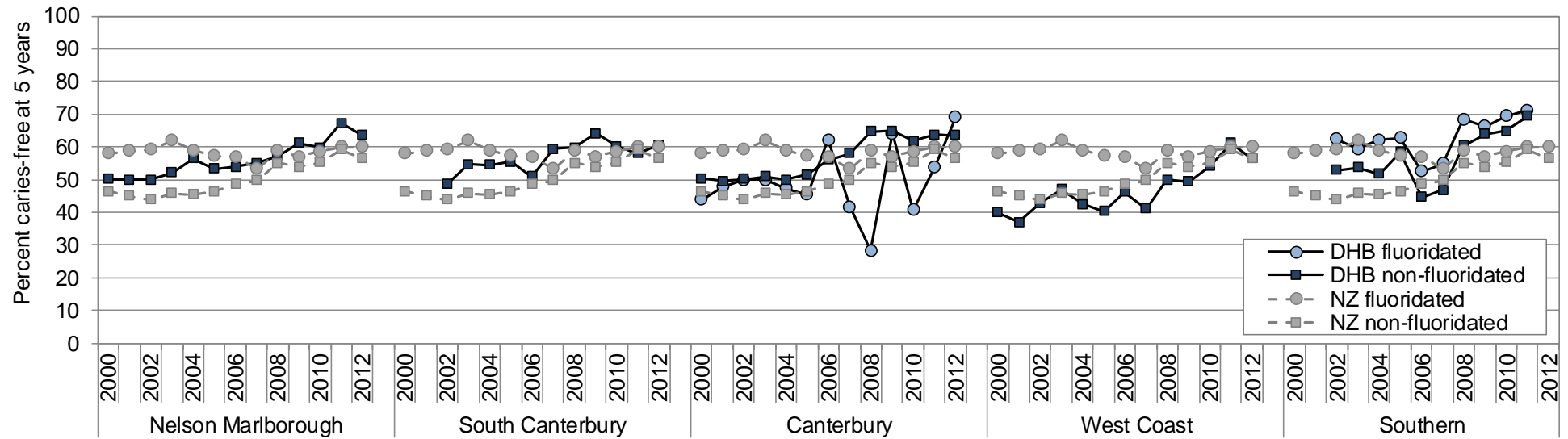
In Southern DHB from during 2003–2012, a higher proportion of European/Other children, than Māori children, were caries-free at age 5 years in both fluoridated and non-fluoridated areas, while in the remaining South Island DHBs a higher proportion of European/Other children than Māori children were caries-free at age 5 years (**Figure 6**).

#### Mean DMFT at age 12 years

In Southern DHB during 2003–2012, mean DMFT scores at age 12 years were higher for Māori children, than for European/Other children, in both fluoridated and non-fluoridated areas, while in the remaining South Island DHBs, mean DMFT scores at age 12 years were higher for Māori children than for European/Other children (**Figure 7**).

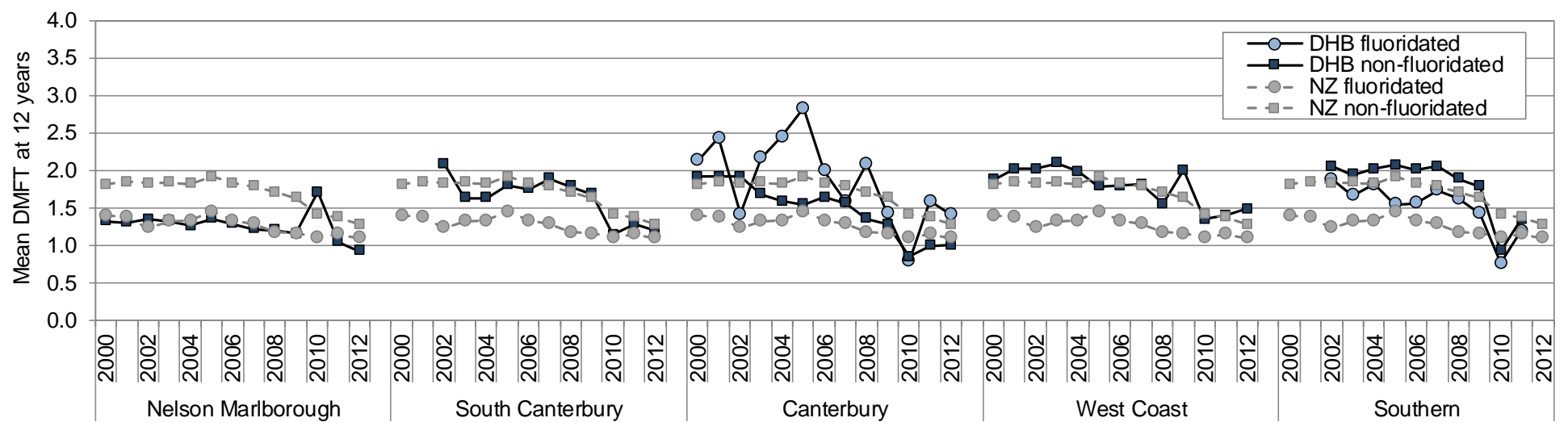


Figure 4. Percentage of children who were caries-free at age 5 years, South Island DHBs vs. New Zealand 2000–2012



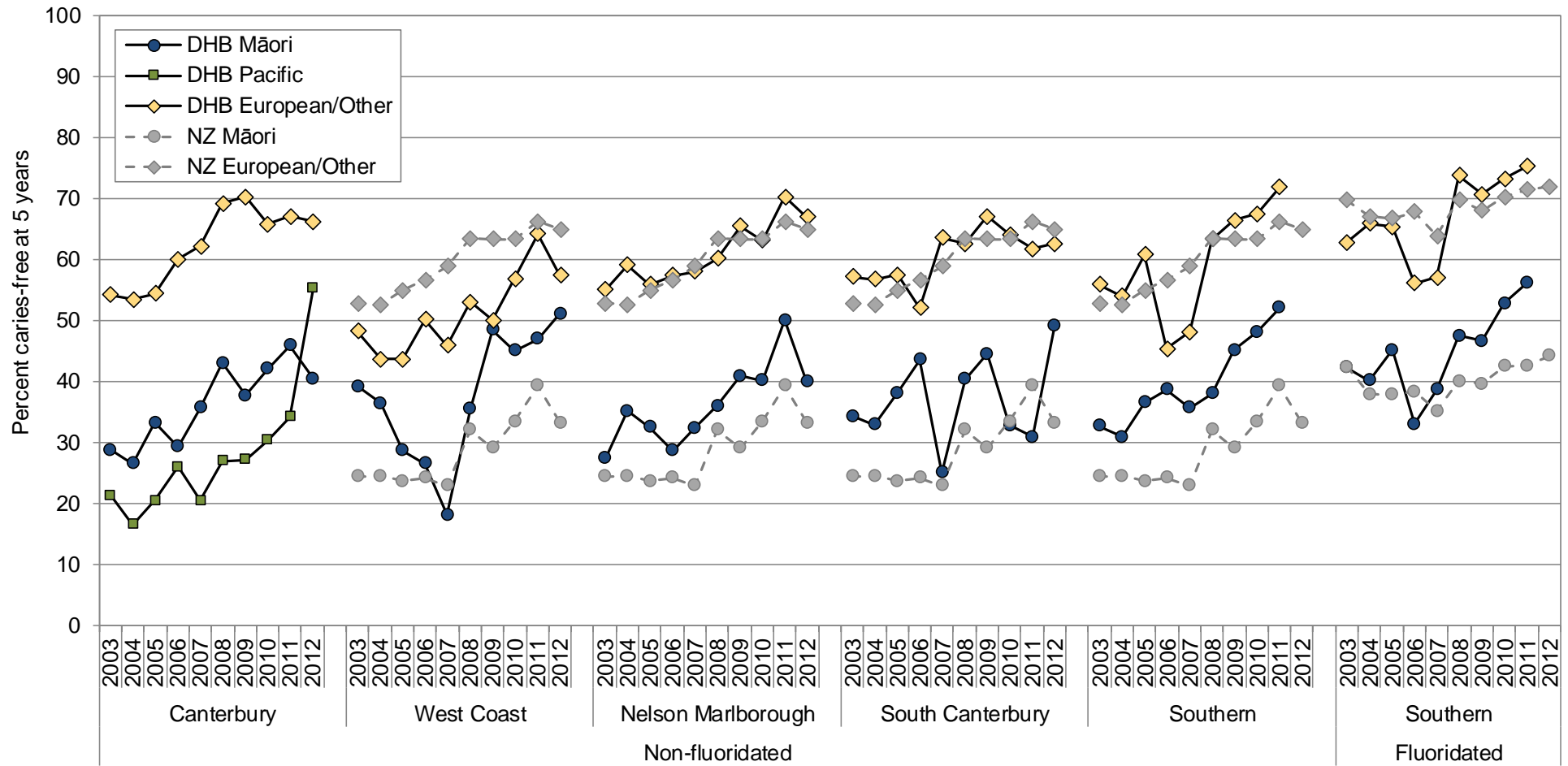
Source: Ministry of Health; Refer to Methods box for note on Southern DHB

Figure 5. Mean scores for the number of decayed, missing or filled permanent teeth (DMFT) at age 12 years, South Island DHBs vs. New Zealand 2000–2012



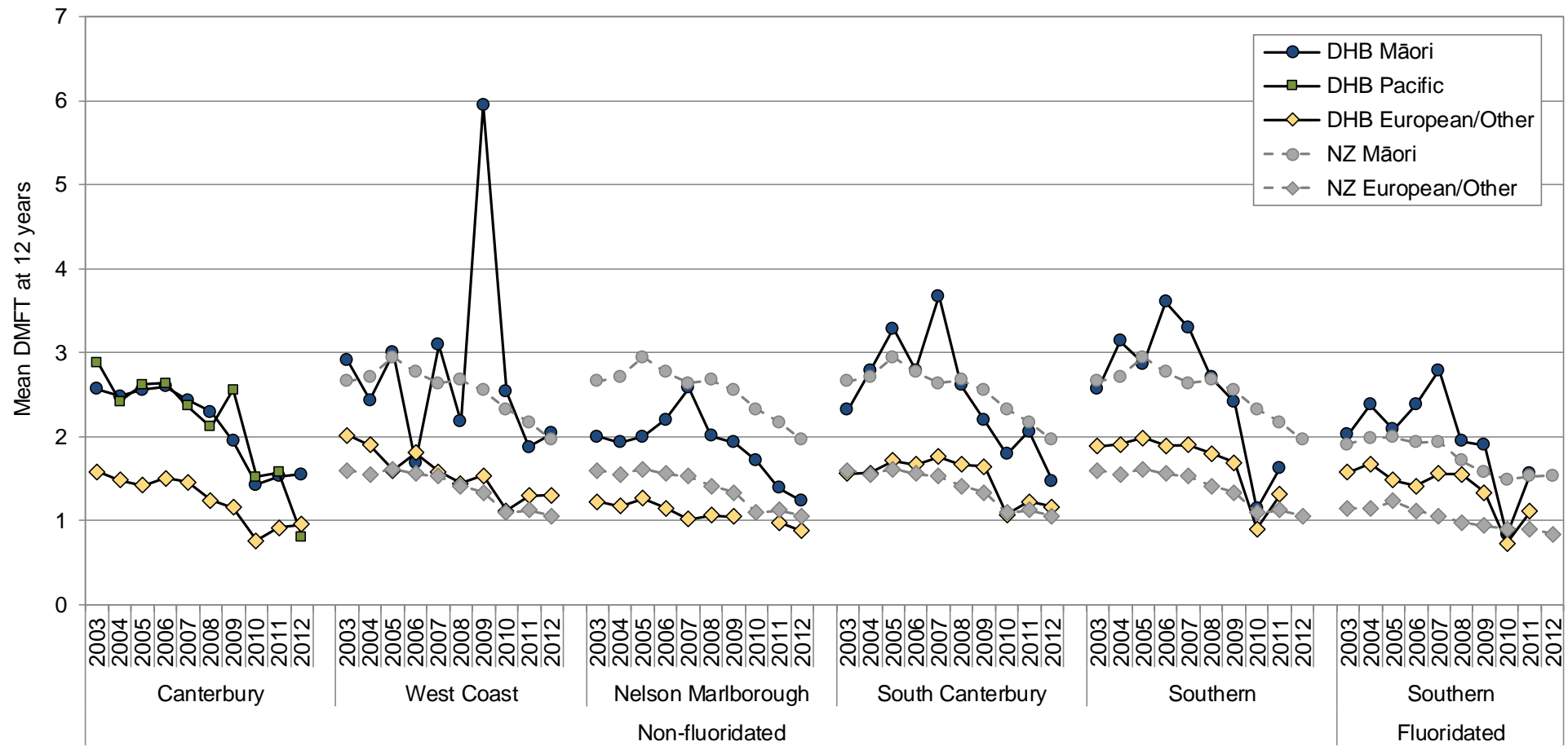
Source: Ministry of Health; Refer to Methods box for note on Southern DHB

Figure 6. Percentage of children who were caries-free at age 5 years by ethnicity, South Island DHBs 2003–2012



Source: Ministry of Health; Refer to Methods box for note on Southern DHB

Figure 7. Mean scores for the number of decayed, missing or filled permanent teeth (DMFT) at age 12 years by ethnicity, South Island DHBs 2003–2012



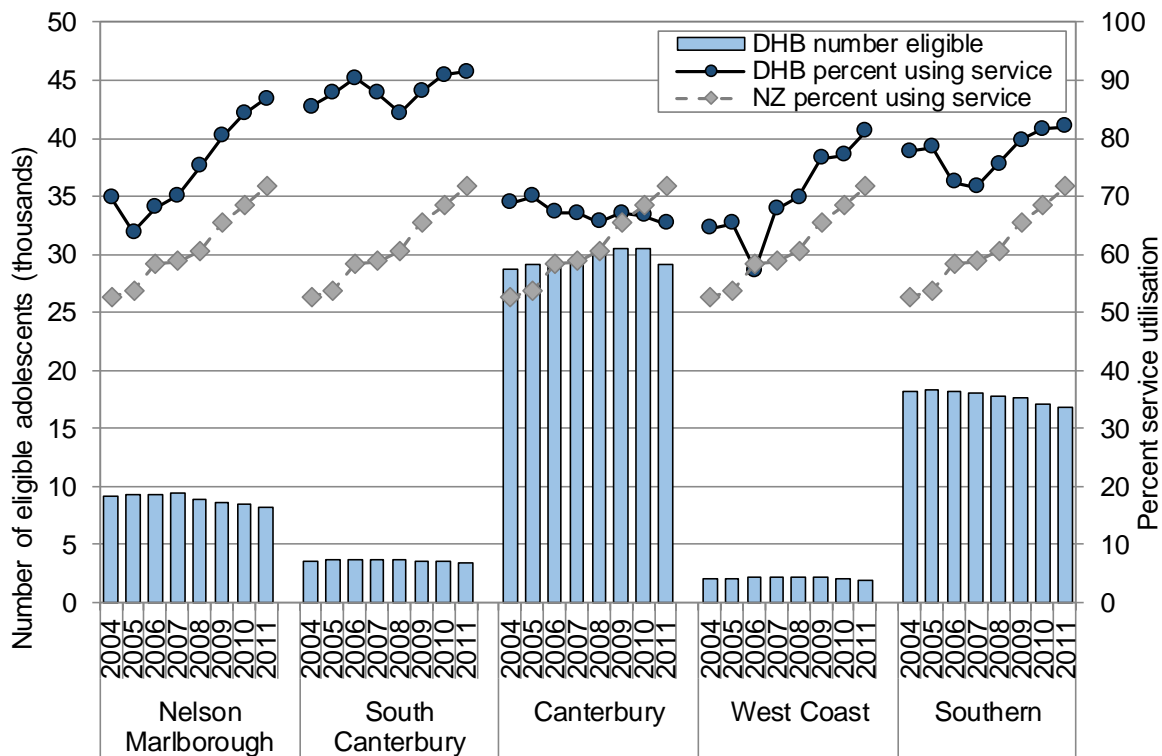
Source: Ministry of Health; Refer to Methods box for note on Southern DHB



## Proportion of adolescents using publicly funded dental services

During 2011, 86.8% of Nelson Marlborough, 91.4% of South Canterbury, 65.4% of Canterbury, 81.2% of West Coast, and 81.9% of Southern adolescents who were eligible (aged ≈13–18 years) were reported as accessing publicly funded dental services. The proportion of eligible adolescents accessing services increased during 2004–2011 in all of the South Island DHBs, with the exception of Canterbury (Figure 8). No information, however, was available for these young people on the frequency or type of service accessed.

Figure 8. Number of adolescents using publicly funded dental services, South Island DHBs vs. New Zealand 2004–2011



Source: Ministry of Health



# HOSPITAL ADMISSIONS FOR DENTAL CARIES

## Data Sources and Methods

### Indicators

#### 1. Hospital admissions for dental caries in children and young people aged 0–24 years

**Numerator:** National Minimum Dataset (NMDS): Hospital admissions (acute, semi acute and waiting list) for children and young people aged 0–24 years with a primary ICD-10-AM diagnosis of dental caries (K02). Other dental conditions assessed in some tables include: Disorders of tooth development/eruption (K00), Embedded/impacted teeth (K01), Other diseases of the teeth hard tissue (K03), Diseases of the pulp/periapical tissue (K04), Gingivitis/Periodontal diseases (K05), Other disorders of the gingiva/edentulous alveolar ridge (K06), Dentofacial anomalies/malocclusion (K07), Other disorders of the teeth or supporting structures (K08).

**Denominator:** Statistics NZ estimated resident population (with linear extrapolation to calculate denominators between Census years).

### Notes on Interpretation

Note 1: An acute admission is an unplanned admission occurring on the day of presentation, while a semi-acute admission (referred to in NMDS as an arranged admission) is a non-acute admission with the admit date being <7 days after the date the decision was made that the admission was necessary. A waiting list admission is a planned admission, where the admission date is 7+ days after the date the decision was made that the admission was necessary. In New Zealand, most DHBs admit children and young people with dental caries/other oral health problems, either from the waiting list, or on a semi-acute basis (as an arranged admission).

Note 2: Limitations of the hospital admission data used are outlined in the Appendix. The reader is urged to review this appendix before interpreting any trends based on hospital admission data.

Note 3: 95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms significant or not significant have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section, so unless the terms 'significant' or 'non-significant' are specifically used the associations described do not imply statistical significance or non-significance (see the appendices for further discussion of this issue).

## New Zealand Distribution and Trends

### New Zealand Trends

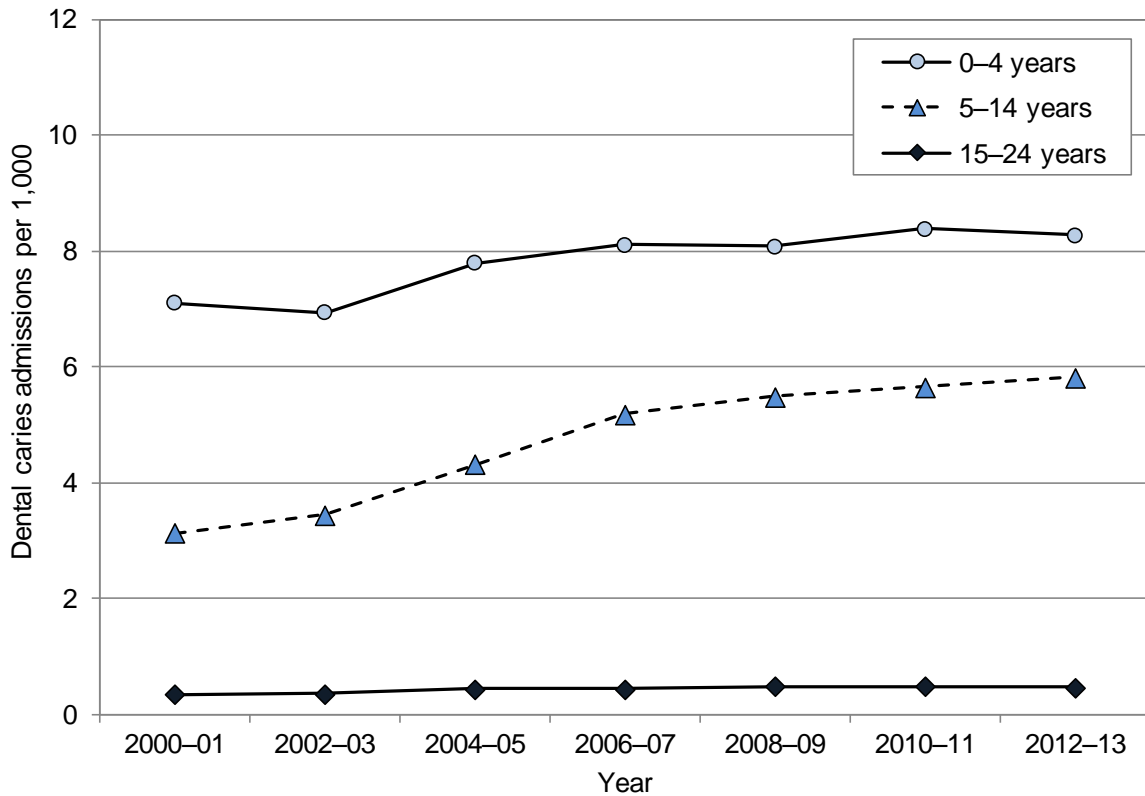
In New Zealand during 2000–2013, hospital admission rates for dental caries were higher for children aged 0–4 years, and aged 5–14 years compared to rates for young people aged 15–24 years. While admissions increased for all three age groups during 2000–2013, in absolute terms, increases were greatest for those aged 5–14 and 0–4 years (**Figure 9**).

### New Zealand Distribution by Age

In New Zealand during 2009–2013, hospital admissions for dental caries were infrequent in infants <1 year, but rose rapidly thereafter, to reach a peak at 4 years of age. Rates then decreased, with admissions being relatively infrequent after 14 years of age (**Figure 10**).

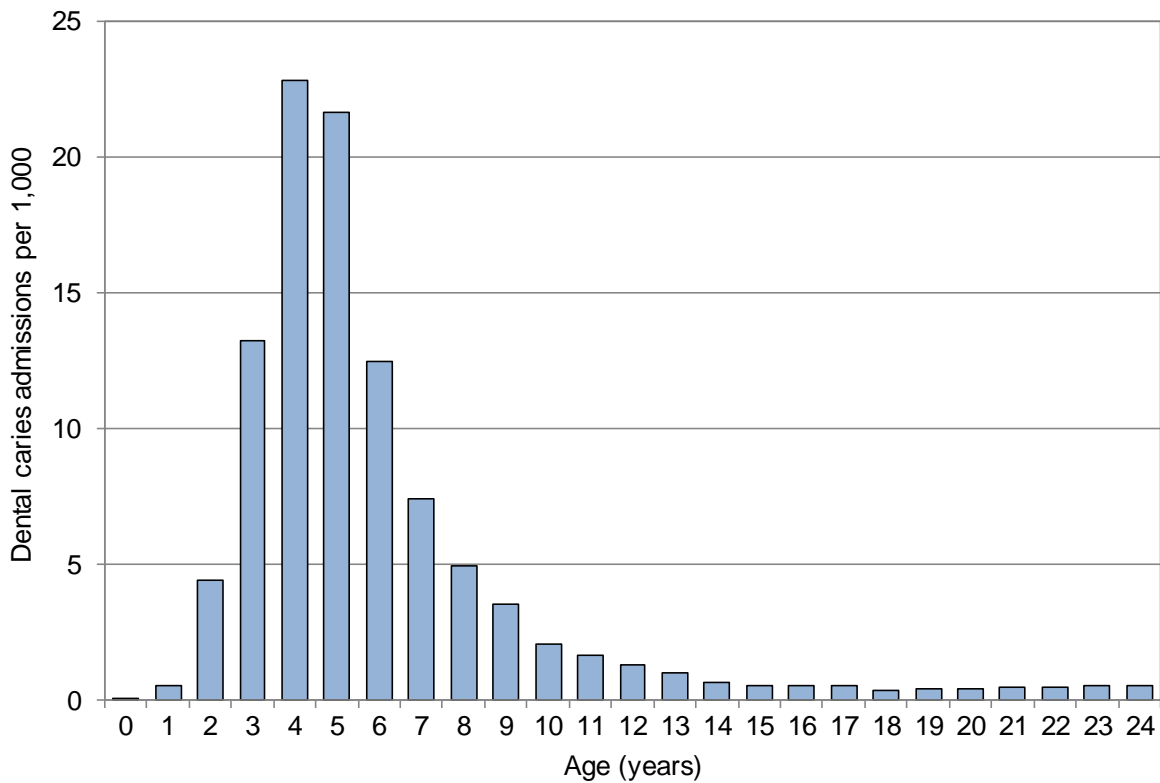


Figure 9. Hospital admissions for dental caries in children and young people aged 0–24 years, New Zealand 2000–2013



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population

Figure 10. Hospital admissions for dental caries in children and young people by age, New Zealand 2009–2013



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population



## New Zealand Distribution by Primary Diagnosis

In New Zealand during 2009–2013, dental caries, followed by diseases of the pulp and periapical tissue, were the leading reasons for a dental admission in children aged 0–4 and aged 5–14 years. In contrast, embedded/impacted teeth, followed by dental caries were the leading reasons for an admission in young people aged 15–24 years (**Table 1**).

Table 1. Hospital admissions for dental conditions in children and young people aged 0–24 years by primary diagnosis, New Zealand 2009–2013

Primary diagnosis	Number: total 2009–2013	Number: annual average	Rate per 1,000	Percent
<b>New Zealand</b>				
<b>0–4 years</b>				
Dental caries	12,600	2,520.0	8.28	86.6
Diseases of the pulp/periapical tissue	1,517	303.4	1.00	10.4
Disorders of tooth development/eruption	185	37.0	0.12	1.3
Other disorders of the teeth/supporting structures	89	17.8	0.06	0.6
Gingivitis/periodontal diseases	60	12.0	0.04	0.4
Dentofacial anomalies/malocclusion	42	8.4	0.03	0.3
Other diseases of the teeth hard tissue	25	5.0	0.02	0.2
Other disorders of the gingiva/edentulous alveolar ridge	21	4.2	0.01	0.1
Embedded/impacted teeth	13	2.6	0.01	0.1
Total 0–4 years	14,552	2,910.4	9.56	100.0
<b>5–14 years</b>				
Dental caries	17,166	3,433.2	5.74	76.7
Diseases of the pulp/periapical tissue	2,241	448.2	0.75	10.0
Disorders of tooth development/eruption	1,283	256.6	0.43	5.7
Embedded/impacted teeth	774	154.8	0.26	3.5
Dentofacial anomalies/malocclusion	384	76.8	0.13	1.7
Other disorders of the teeth/supporting structures	235	47.0	0.08	1.1
Other diseases of the teeth hard tissue	196	39.2	0.07	0.9
Gingivitis/periodontal diseases	68	13.6	0.02	0.3
Other disorders of the gingiva/edentulous alveolar ridge	23	4.6	0.01	0.1
Total 5–14 years	22,370	4,474.0	7.48	100.0
<b>15–24 years</b>				
Embedded/impacted teeth	2,677	535.4	0.86	42.2
Dental caries	1,485	297.0	0.48	23.4
Diseases of the pulp/periapical tissue	679	135.8	0.22	10.7
Dentofacial anomalies/malocclusion	655	131.0	0.21	10.3
Gingivitis/periodontal diseases	375	75.0	0.12	5.9
Other disorders of the teeth/supporting structures	169	33.8	0.05	2.7
Other diseases of the teeth hard tissue	146	29.2	0.05	2.3
Disorders of tooth development/eruption	133	26.6	0.04	2.1
Other disorders of the gingiva/edentulous alveolar ridge	25	5.0	0.01	0.4
Total 15–24 years	6,344	1,268.8	2.04	100.0

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population



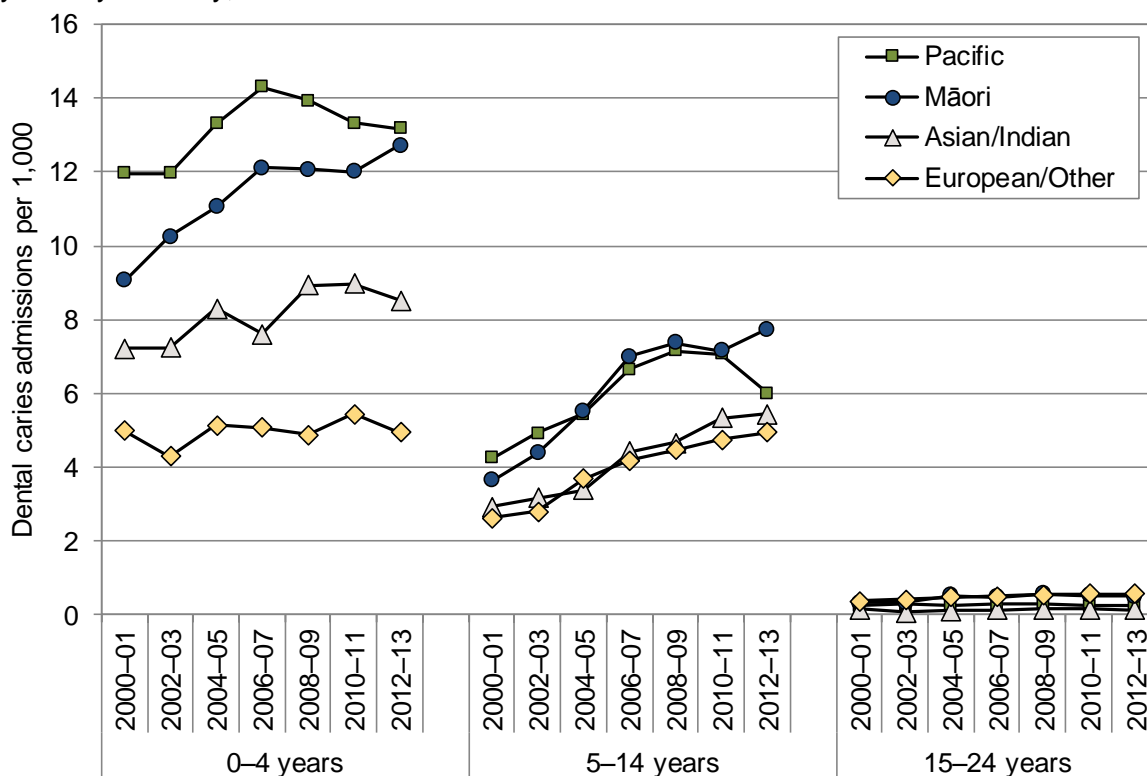
## New Zealand Distribution by Ethnicity, NZDep Index decile, and Gender

In New Zealand during 2009–2013, hospital admissions for dental caries in children aged 0–4 years were *significantly higher* for males, Pacific, Māori, and Asian/Indian children (compared to European/Other children), and for those from average-to-most deprived areas (NZDep decile 4–10) (**Table 2**).

Similarly, admissions for children aged 5–14 years were *significantly higher* for males, Māori and Pacific > Asian/Indian children (compared to European/Other children), and for those from average-to-more deprived areas (NZDep decile 3–10) (**Table 2**).

In contrast, for young people aged 15–24 years, admissions were *significantly lower* for Asian/Indian and Pacific young people (compared to European/Other young people), and *significantly higher* for those from more deprived areas (NZDep decile 6–9) (**Table 2**). Similar ethnic differences were seen during 2000–2013 (**Figure 11**).

Figure 11. Hospital admissions for dental caries in children and young people aged 0–24 years by ethnicity, New Zealand 2000–2013



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.  
Note: Ethnicity is level 1 prioritised



Table 2. Hospital admissions for dental caries in children and young people aged 0–24 years by gender, ethnicity, and NZ Deprivation Index decile, New Zealand 2009–2013

Variable	Rate	Rate ratio	95% CI	Variable	Rate	Rate ratio	95% CI
<b>New Zealand</b>							
<b>Dental caries admissions 0–4 years</b>							
NZ Deprivation Index decile				NZ Deprivation Index quintile			
Decile 1	4.24	1.00		Decile 1–2	4.24	1.00	
Decile 2	4.24	1.00	0.89–1.13	Decile 3–4	5.05	1.19	1.10–1.29
Decile 3	4.63	1.09	0.97–1.23	Decile 5–6	6.85	1.62	1.50–1.74
Decile 4	5.47	1.29	1.15–1.45	Decile 7–8	9.06	2.14	2.00–2.29
Decile 5	6.78	1.60	1.44–1.78	Decile 9–10	13.57	3.20	3.00–3.42
Decile 6	6.93	1.64	1.47–1.82	Prioritised ethnicity			
Decile 7	8.28	1.96	1.76–2.17	Māori	12.29	2.37	2.28–2.47
Decile 8	9.73	2.30	2.08–2.54	Pacific	13.14	2.54	2.41–2.68
Decile 9	11.95	2.82	2.56–3.11	Asian/Indian	8.74	1.69	1.59–1.79
Decile 10	15.06	3.56	3.24–3.91	European/Other	5.18	1.00	
<b>Gender</b>							
Female	7.98	1.00		Male	8.56	1.07	1.04–1.11
<b>Dental caries admissions 5–14 years</b>							
NZ Deprivation Index decile				NZ Deprivation Index quintile			
Decile 1	3.38	1.00		Decile 1–2	3.33	1.00	
Decile 2	3.28	0.97	0.89–1.06	Decile 3–4	4.15	1.25	1.17–1.32
Decile 3	3.75	1.11	1.02–1.21	Decile 5–6	5.45	1.64	1.55–1.73
Decile 4	4.55	1.35	1.24–1.47	Decile 7–8	6.81	2.05	1.94–2.16
Decile 5	5.26	1.56	1.44–1.69	Decile 9–10	8.40	2.52	2.40–2.66
Decile 6	5.66	1.68	1.55–1.82	Prioritised ethnicity			
Decile 7	6.44	1.91	1.77–2.06	Māori	7.49	1.55	1.50–1.61
Decile 8	7.14	2.11	1.96–2.28	Pacific	6.67	1.38	1.32–1.45
Decile 9	8.04	2.38	2.21–2.56	Asian/Indian	5.34	1.11	1.05–1.17
Decile 10	8.71	2.58	2.40–2.77	European/Other	4.82	1.00	
<b>Gender</b>							
Female	5.60	1.00		Male	5.87	1.05	1.02–1.08
<b>Dental caries admissions 15–24 years</b>							
NZ Deprivation Index decile				NZ Deprivation Index quintile			
Decile 1	0.38	1.00		Decile 1–2	0.34	1.00	
Decile 2	0.30	0.81	0.60–1.08	Decile 3–4	0.35	1.02	0.83–1.26
Decile 3	0.35	0.92	0.68–1.23	Decile 5–6	0.48	1.43	1.19–1.73
Decile 4	0.34	0.91	0.68–1.22	Decile 7–8	0.59	1.75	1.47–2.09
Decile 5	0.47	1.23	0.94–1.61	Decile 9–10	0.55	1.63	1.37–1.94
Decile 6	0.50	1.33	1.02–1.74	Prioritised ethnicity			
Decile 7	0.55	1.46	1.13–1.89	Māori	0.55	0.98	0.86–1.10
Decile 8	0.62	1.65	1.29–2.10	Pacific	0.29	0.52	0.41–0.65
Decile 9	0.62	1.64	1.29–2.08	Asian/Indian	0.14	0.25	0.19–0.32
Decile 10	0.48	1.28	1.00–1.65	European/Other	0.56	1.00	
<b>Gender</b>							
Female	0.49	1.00		Male	0.47	0.96	0.87–1.07

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.  
 Note: Rates are per 1,000; Ethnicity is level 1 prioritised; Decile is NZDep2006



## South Island DHBs Distribution and Trends

### South Island DHBs Distribution by Primary Diagnosis

In the South Island DHBs during 2009–2013, dental caries were the leading reason for a dental admission in children aged 0–4 and 5–14 years. In Nelson Marlborough, Canterbury, the West Coast, and in the Otago area, embedded/ impacted teeth were the leading reason for a dental admission in young people aged 15–24 years, while in the South Canterbury and in the Southland area, dental caries were the leading reason for a dental admission in this older age group (**Table 3–Table 8**).

Table 3. Hospital admissions for dental conditions in children and young people aged 0–24 years, Nelson Marlborough 2009–2013

Primary diagnosis	Number: total 2009– 2013	Number: annual average	Rate per 1,000	Percent
<b>Nelson Marlborough</b>				
<b>0–4 years</b>				
Dental caries	266	53.2	6.28	61.6
Diseases of the pulp/periapical tissue	140	28.0	3.31	32.4
Disorders of tooth development/eruption	17	3.4	0.40	3.9
Other disorders of the teeth/supporting structures	6	1.2	0.14	1.4
Dentofacial anomalies/malocclusion	<3	s	s	s
Gingivitis/periodontal diseases	<3	s	s	s
Total 0–4 years	432	86.4	10.20	100.0
<b>5–14 years</b>				
Dental caries	461	92.2	5.05	50.6
Diseases of the pulp/periapical tissue	227	45.4	2.48	24.9
Disorders of tooth development/eruption	131	26.2	1.43	14.4
Embedded/impacted teeth	31	6.2	0.34	3.4
Dentofacial anomalies/malocclusion	29	5.8	0.32	3.2
Other disorders of the teeth/supporting structures	23	4.6	0.25	2.5
Other diseases of the teeth hard tissue	9	1.8	0.10	1.0
Total 5–14 years	911	182.2	9.97	100.0
<b>15–24 years</b>				
Embedded/impacted teeth	92	18.4	1.22	37.1
Dental caries	53	10.6	0.70	21.4
Diseases of the pulp/periapical tissue	27	5.4	0.36	10.9
Dentofacial anomalies/malocclusion	26	5.2	0.34	10.5
Gingivitis/periodontal diseases	24	4.8	0.32	9.7
Disorders of tooth development/eruption	13	2.6	0.17	5.2
Other disorders of the teeth/supporting structures	6	1.2	0.08	2.4
Other diseases of the teeth hard tissue	6	1.2	0.08	2.4
Other disorders of the gingiva/edentulous alveolar ridge	<3	s	s	s
Total 15–24 years	248	49.6	3.28	100.0

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.  
Note: s: suppressed due to small numbers



Table 4. Hospital admissions for dental conditions in children and young people aged 0–24 years, South Canterbury 2009–2013

Primary diagnosis	Number: total 2009– 2013	Number: annual average	Rate per 1,000	Percent
<b>South Canterbury</b>				
<b>0–4 years</b>				
Dental caries	70	14.0	4.20	57.9
Diseases of the pulp/periapical tissue	43	8.6	2.58	35.5
Disorders of tooth development/eruption	3	0.6	0.18	2.5
Other disorders of the teeth/supporting structures	3	0.6	0.18	2.5
Other diseases of the teeth hard tissue	<3	s	s	s
<b>Total 0–4 years</b>	<b>121</b>	<b>24.2</b>	<b>7.25</b>	<b>100.0</b>
<b>5–14 years</b>				
Dental caries	151	30.2	4.17	54.5
Diseases of the pulp/periapical tissue	83	16.6	2.29	30.0
Other disorders of the teeth/supporting structures	16	3.2	0.44	5.8
Disorders of tooth development/eruption	14	2.8	0.39	5.1
Embedded/impacted teeth	4	0.8	0.11	1.4
Other diseases of the teeth hard tissue	4	0.8	0.11	1.4
Dentofacial anomalies/malocclusion	3	0.6	0.08	1.1
Gingivitis/periodontal diseases	<3	s	s	s
<b>Total 5–14 years</b>	<b>277</b>	<b>55.4</b>	<b>7.64</b>	<b>100.0</b>
<b>15–24 years</b>				
Dental caries	46	9.2	1.44	45.5
Embedded/impacted teeth	37	7.4	1.16	36.6
Dentofacial anomalies/malocclusion	6	1.2	0.19	5.9
Diseases of the pulp/periapical tissue	5	1.0	0.16	5.0
Other diseases of the teeth hard tissue	4	0.8	0.13	4.0
Disorders of tooth development/eruption	<3	s	s	s
Gingivitis/periodontal diseases	<3	s	s	s
<b>Total 15–24 years</b>	<b>101</b>	<b>20.2</b>	<b>3.16</b>	<b>100.0</b>

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.  
Note: s: suppressed due to small numbers





Table 5. Hospital admissions for dental conditions in children and young people aged 0–24 years, Canterbury 2009–2013

Primary diagnosis	Number: total 2009– 2013	Number: annual average	Rate per 1,000	Percent
<b>Canterbury</b>				
<b>0–4 years</b>				
Dental caries	1,041	208.2	6.57	97.8
Diseases of the pulp/periapical tissue	15	3.0	0.09	1.4
Disorders of tooth development/eruption	4	0.8	0.03	0.4
Other disorders of the teeth/supporting structures	<3	s	s	s
Gingivitis/periodontal diseases	<3	s	s	s
Dentofacial anomalies/malocclusion	<3	s	s	s
Total 0–4 years	1,064	212.8	6.72	100.0
<b>5–14 years</b>				
Dental caries	2,124	424.8	6.76	93.2
Disorders of tooth development/eruption	55	11.0	0.17	2.4
Embedded/impacted teeth	32	6.4	0.10	1.4
Diseases of the pulp/periapical tissue	29	5.8	0.09	1.3
Dentofacial anomalies/malocclusion	20	4.0	0.06	0.9
Other diseases of the teeth hard tissue	9	1.8	0.03	0.4
Other disorders of the teeth/supporting structures	6	1.2	0.02	0.3
Gingivitis/periodontal diseases	3	0.6	0.01	0.1
Other disorders of the gingiva/edentulous alveolar ridge	<3	s	s	s
Total 5–14 years	2,280	456.0	7.25	100.0
<b>15–24 years</b>				
Embedded/impacted teeth	204	40.8	0.58	49.2
Dental caries	105	21.0	0.30	25.3
Dentofacial anomalies/malocclusion	62	12.4	0.18	14.9
Diseases of the pulp/periapical tissue	23	4.6	0.06	5.5
Disorders of tooth development/eruption	10	2.0	0.03	2.4
Gingivitis/periodontal diseases	7	1.4	0.02	1.7
Other disorders of the teeth/supporting structures	<3	s	s	s
Other diseases of the teeth hard tissue	<3	s	s	s
Total 15–24 years	415	83.0	1.17	100.0

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.  
Note: s: suppressed due to small numbers



Table 6. Hospital admissions for dental conditions in children and young people aged 0–24 years, West Coast 2009–2013

Primary diagnosis	Number: total 2009–2013	Number: annual average	Rate per 1,000	Percent
<b>West Coast</b>				
<b>0–4 years</b>				
Dental caries	120	24.0	11.33	93.8
Diseases of the pulp/periapical tissue	5	1.0	0.47	3.9
Other disorders of the teeth/supporting structures	<3	s	s	s
Disorders of tooth development/eruption	<3	s	s	s
Total 0–4 years	128	25.6	12.08	100.0
<b>5–14 years</b>				
Dental caries	133	26.6	6.29	84.7
Diseases of the pulp/periapical tissue	12	2.4	0.57	7.6
Embedded/impacted teeth	5	1.0	0.24	3.2
Disorders of tooth development/eruption	3	0.6	0.14	1.9
Gingivitis/periodontal diseases	<3	s	s	s
Other disorders of the teeth/supporting structures	<3	s	s	s
Other diseases of the teeth hard tissue	<3	s	s	s
Total 5–14 years	157	31.4	7.43	100.0
<b>15–24 years</b>				
Dental caries	6	1.2	0.33	24.0
Dentofacial anomalies/malocclusion	6	1.2	0.33	24.0
Embedded/impacted teeth	6	1.2	0.33	24.0
Diseases of the pulp/periapical tissue	5	1.0	0.27	20.0
Gingivitis/periodontal diseases	<3	s	s	s
Other diseases of the teeth hard tissue	<3	s	s	s
Total 15–24 years	25	5.0	1.37	100.0

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.  
 Note: s: suppressed due to small numbers



Table 7. Hospital admissions for dental conditions in children and young people aged 0–24 years, Otago 2009–2013

Primary diagnosis	Number: total 2009– 2013	Number: annual average	Rate per 1,000	Percent
<b>Otago</b>				
<b>0–4 years</b>				
Dental caries	259	51.8	4.83	70.4
Diseases of the pulp/periapical tissue	66	13.2	1.23	17.9
Disorders of tooth development/eruption	26	5.2	0.49	7.1
Other disorders of the teeth/supporting structures	6	1.2	0.11	1.6
Gingivitis/periodontal diseases	3	0.6	0.06	0.8
Dentofacial anomalies/malocclusion	3	0.6	0.06	0.8
Other diseases of the teeth hard tissue	3	0.6	0.06	0.8
Embedded/impacted teeth	<3	s	s	s
Other disorders of the gingiva/edentulous alveolar ridge	<3	s	s	s
Total 0–4 years	368	73.6	6.87	100.0
<b>5–14 years</b>				
Dental caries	510	102.0	4.63	50.0
Diseases of the pulp/periapical tissue	174	34.8	1.58	17.1
Disorders of tooth development/eruption	171	34.2	1.55	16.8
Dentofacial anomalies/malocclusion	77	15.4	0.70	7.5
Embedded/impacted teeth	66	13.2	0.60	6.5
Other disorders of the teeth/supporting structures	12	2.4	0.11	1.2
Other diseases of the teeth hard tissue	9	1.8	0.08	0.9
Other disorders of the gingiva/edentulous alveolar ridge	<3	s	s	s
Total 5–14 years	1,020	204.0	9.26	100.0
<b>15–24 years</b>				
Embedded/impacted teeth	235	47.0	1.42	44.3
Gingivitis/periodontal diseases	95	19.0	0.58	17.9
Dentofacial anomalies/malocclusion	89	17.8	0.54	16.8
Dental caries	62	12.4	0.38	11.7
Diseases of the pulp/periapical tissue	25	5.0	0.15	4.7
Disorders of tooth development/eruption	15	3.0	0.09	2.8
Other disorders of the teeth/supporting structures	4	0.8	0.02	0.8
Other diseases of the teeth hard tissue	3	0.6	0.02	0.6
Other disorders of the gingiva/edentulous alveolar ridge	<3	s	s	s
Total 15–24 years	530	106.0	3.21	100.0

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.  
Note: s: suppressed due to small numbers



Table 8. Hospital admissions for dental conditions in children and young people aged 0–24 years, Southland 2009–2013

Primary diagnosis	Number: total 2009–2013	Number: annual average	Rate per 1,000	Percent
<b>Southland</b>				
<b>0–4 years</b>				
Dental caries	657	131.4	16.66	93.7
Diseases of the pulp/periapical tissue	28	5.6	0.71	4.0
Disorders of tooth development/eruption	13	2.6	0.33	1.9
Other disorders of the teeth/supporting structures	<3	s	s	s
Embedded/impacted teeth	<3	s	s	s
Other diseases of the teeth hard tissue	<3	s	s	s
Total 0–4 years	701	140.2	17.78	100.0
<b>5–14 years</b>				
Dental caries	842	168.4	11.10	85.3
Disorders of tooth development/eruption	75	15.0	0.99	7.6
Diseases of the pulp/periapical tissue	44	8.8	0.58	4.5
Embedded/impacted teeth	11	2.2	0.15	1.1
Dentofacial anomalies/malocclusion	6	1.2	0.08	0.6
Other diseases of the teeth hard tissue	5	1.0	0.07	0.5
Other disorders of the teeth/supporting structures	<3	s	s	s
Gingivitis/periodontal diseases	<3	s	s	s
Other disorders of the gingiva/edentulous alveolar ridge	<3	s	s	s
Total 5–14 years	987	197.4	13.01	100.0
<b>15–24 years</b>				
Dental caries	84	16.8	1.18	39.8
Embedded/impacted teeth	65	13.0	0.91	30.8
Dentofacial anomalies/malocclusion	29	5.8	0.41	13.7
Diseases of the pulp/periapical tissue	17	3.4	0.24	8.1
Gingivitis/periodontal diseases	8	1.6	0.11	3.8
Other diseases of the teeth hard tissue	6	1.2	0.08	2.8
Disorders of tooth development/eruption	<3	s	s	s
Other disorders of the gingiva/edentulous alveolar ridge	<3	s	s	s
Total 15–24 years	211	42.2	2.96	100.0

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.  
Note: s: suppressed due to small numbers

### South Island DHBs vs. New Zealand

In the West Coast, and in the Southland area during 2009–2013, hospital admissions for dental caries in children aged 0–4 years were *significantly higher* than the New Zealand rate, while in Nelson Marlborough, South Canterbury, Canterbury, and in the Otago area, rates were *significantly lower* (Table 9).

Similarly, admissions for dental caries in children aged 5–14 years were *significantly higher* than the New Zealand rate in Canterbury, and in the Southland area, but *significantly lower* than the New Zealand rate in Nelson Marlborough, South Canterbury, and in the Otago area (Table 9).



In young people aged 15–24 years, admissions for dental caries were *significantly higher* than the New Zealand rate in Nelson Marlborough, South Canterbury, and in the Southland area, and *significantly lower* than the New Zealand rate in Canterbury. The rates in the West Coast, and in the Otago area were *not significantly* different from the New Zealand rate (**Table 9**).

Table 9. Hospital admissions for dental caries in children and young people aged 0–24 years, South Island DHBs/Areas vs. New Zealand 2009–2013

DHB/Area	Number: total 2009–2013	Number: annual average	Rate per 1,000	Rate ratio	95% CI
<b>Dental caries</b>					
<b>0–4 years</b>					
Nelson Marlborough	266	53.2	6.3	0.76	0.67–0.86
South Canterbury	70	14.0	4.2	0.51	0.40–0.64
Canterbury	1,041	208.2	6.6	0.79	0.75–0.85
West Coast	120	24.0	11.3	1.37	1.14–1.64
Otago	259	51.8	4.8	0.58	0.52–0.66
Southland	657	131.4	16.7	2.01	1.86–2.18
New Zealand	12,600	2,520.0	8.3	1.00	
<b>5–14 years</b>					
Nelson Marlborough	461	92.2	5.0	0.88	0.80–0.96
South Canterbury	151	30.2	4.2	0.73	0.62–0.85
Canterbury	2,124	424.8	6.8	1.18	1.13–1.23
West Coast	133	26.6	6.3	1.10	0.93–1.30
Otago	510	102.0	4.6	0.81	0.74–0.88
Southland	842	168.4	11.1	1.94	1.81–2.07
New Zealand	17,166	3,433.2	5.7	1.00	
<b>15–24 years</b>					
Nelson Marlborough	53	10.6	0.7	1.47	1.11–1.93
South Canterbury	46	9.2	1.4	3.01	2.24–4.03
Canterbury	105	21.0	0.3	0.62	0.51–0.76
West Coast	6	1.2	0.3	0.69	0.31–1.54
Otago	62	12.4	0.4	0.79	0.61–1.01
Southland	84	16.8	1.2	2.46	1.97–3.06
New Zealand	1,485	297.0	0.5	1.00	

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population

### South Island DHBs Trends

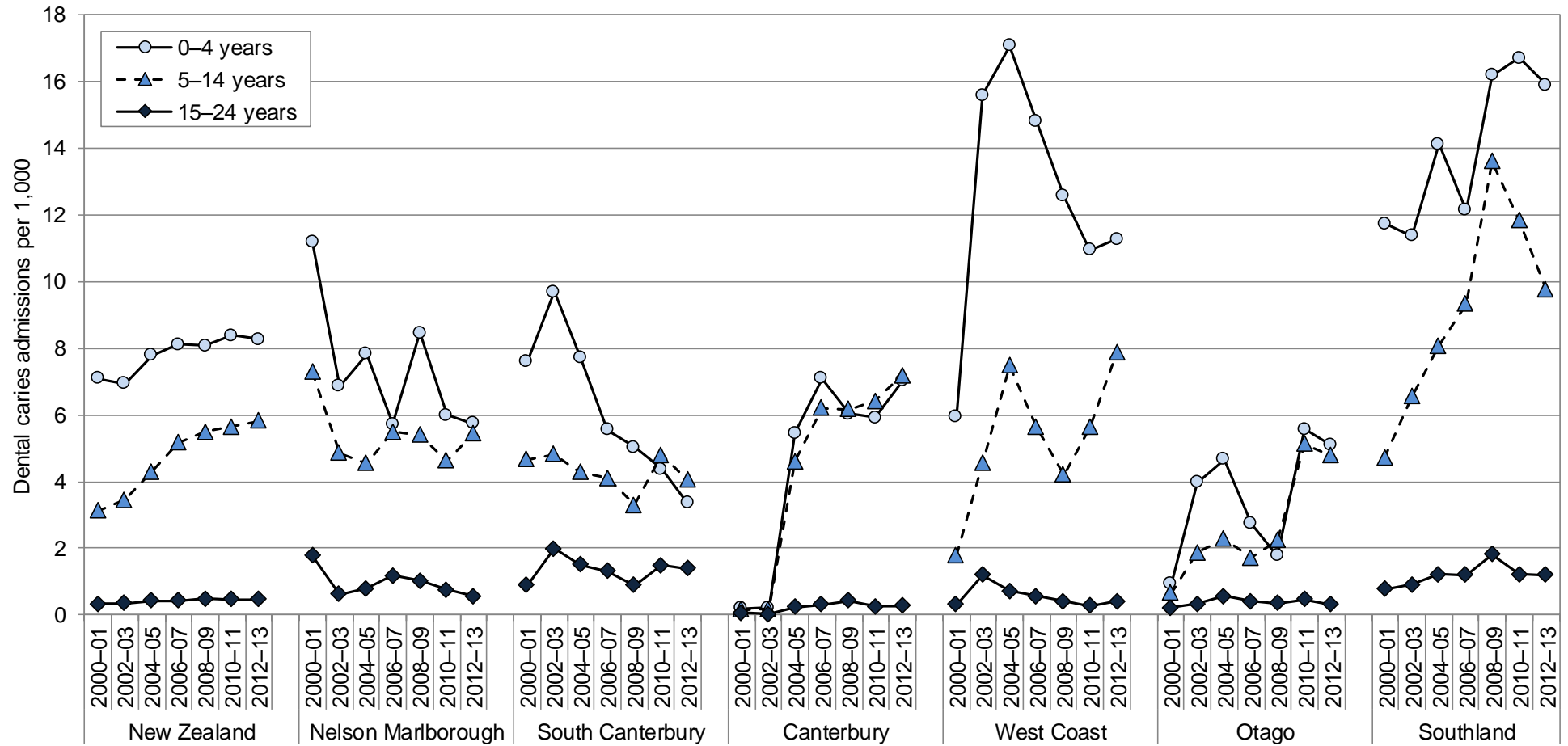
In Canterbury, the West Coast, and in the Otago and Southland areas during 2000–2013, hospital admissions for dental caries increased in children aged 0–4 and 5–14 years, although trends in the remaining South Island DHBs were less consistent (**Figure 12**).

### South Island DHBs Distribution by Ethnicity

In all of the South Island DHBs during 2000–2013, hospital admissions for dental caries in children aged 0–4 and 5–14 year were generally higher for Māori than for European/Other children (**Figure 13**). Small numbers precluded an analysis of ethnic differences for young people aged 15–24 years.

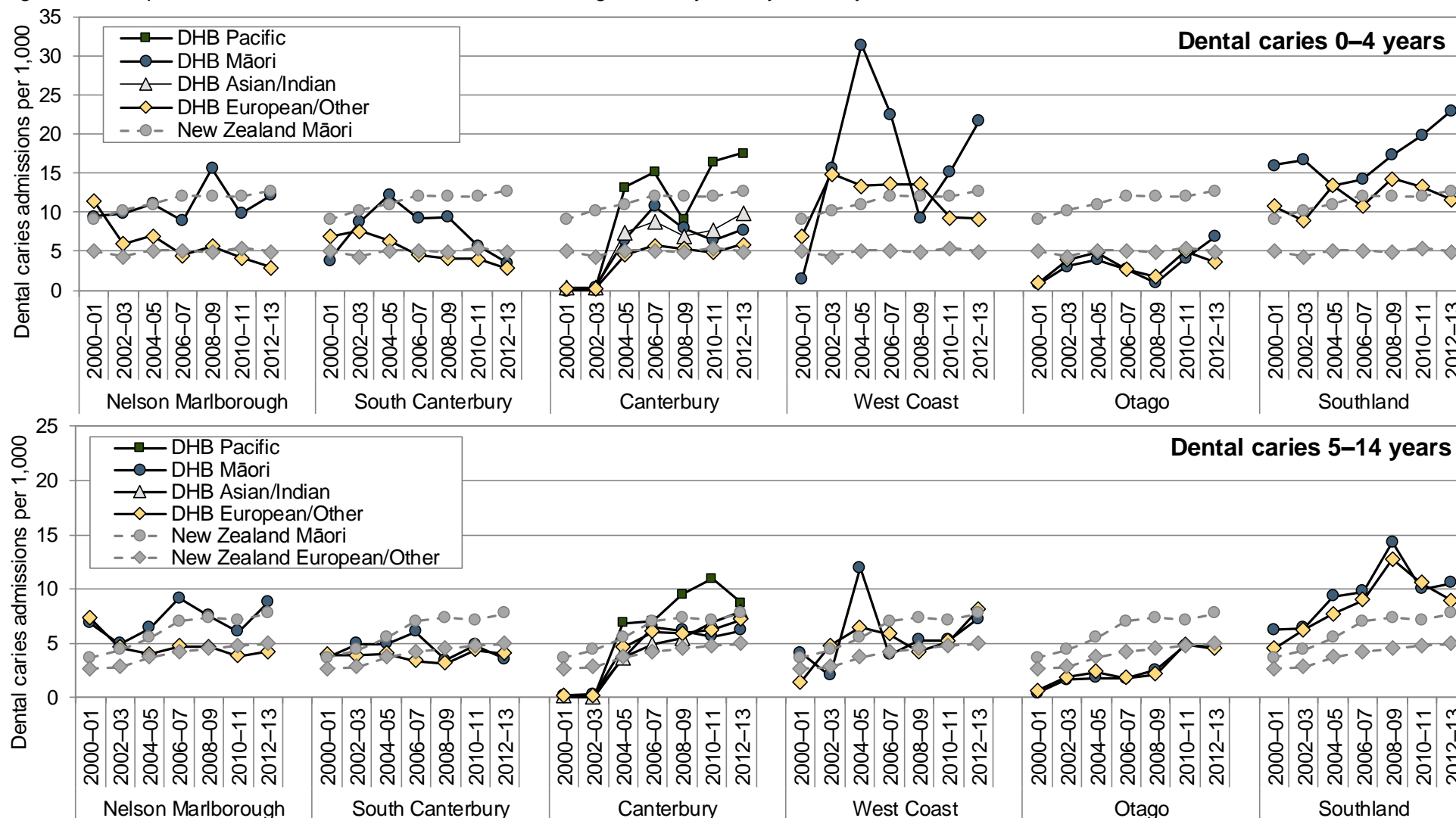


Figure 12. Hospital admissions for dental caries in children and young people aged 0–24 years, South Island DHBs vs. New Zealand 2000–2013



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population

Figure 13. Hospital admissions for dental caries in children aged 0–14 years by ethnicity, South Island DHBs vs. New Zealand 2000–2013



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population. Note: Ethnicity is level 1 prioritised

## Local Policy Documents and Evidence-Based Reviews Relevant to Oral Health in Children and Young People

In New Zealand, there are a number of Ministry of Health publications that provide guidance to the health sector on the establishment of optimal oral health services, the identification of those most at risk of poor oral health, and the roles the Ministry of Health and DHBs are expected to play in improving oral health outcomes for children and young people. In addition, there are a large number of reviews in the international literature concerning the effectiveness of particular interventions in the prevention and management of dental caries in this age group. These publications are briefly summarised in **Table 10**.

Table 10. Local policy documents and evidence based reviews relevant to oral health

<b>Ministry of Health publications</b>
<p>Ministry of Health. 2013. <b>Community Water Fluoridation</b>. Wellington: Ministry of Health. <a href="http://www.health.govt.nz/system/files/documents/publications/water-fluoridation.pdf">http://www.health.govt.nz/system/files/documents/publications/water-fluoridation.pdf</a></p> <p>This brief pamphlet provides information for the general public about the benefits and safety of water fluoridation.</p>
<p>Cram F, Oakden J &amp; Wehipeihana N. 2011. <b>Future Directions for a Māori Dental Therapy Workforce</b>. Wellington: Ministry of Health. <a href="http://www.health.govt.nz/system/files/documents/publications/future-directions-maori-dental-workforce_0.pdf">http://www.health.govt.nz/system/files/documents/publications/future-directions-maori-dental-workforce_0.pdf</a></p> <p>This is the report of a project which examined the current and future needs of the Māori dental therapy workforce considering the supply of Māori dental therapists and the oral health service requirements of Māori children and young people. The report authors note that Māori children have a higher severity of dental caries than non-Māori children and that the Māori population is growing so that the proportion of children who are Māori will increase over time. They state that the number of Māori dental therapists needs to increase and that at least 8–10 Māori students need to begin training as dental therapists each year. To achieve this, more Māori students need to study science subjects in their final years at secondary school, the science curriculum may need to be made more relevant to Māori students, and tertiary scholarships need to be provided. District health boards need to ensure that the working conditions and salaries of dental therapists in the public service are attractive and that Māori dental therapists are supported to practice.</p>
<p>Ministry of Health. 2008. <b>Promoting Oral Health: A toolkit to assist the development, planning, implementation and evaluation of oral health promotion in New Zealand</b>. Wellington: Ministry of Health. <a href="http://www.health.govt.nz/system/files/documents/publications/promoting-oralhealth-a-toolkit-jan08.pdf">http://www.health.govt.nz/system/files/documents/publications/promoting-oralhealth-a-toolkit-jan08.pdf</a></p> <p>This toolkit, written for policy makers, planners and funders, oral health professionals and other interested persons, is a practical guide for the design, delivery and implementation of oral health promotion programmes. It does not include a review of the evidence for oral health promotion interventions.</p>
<p>Ministry of Health. 2008. <b>Early Childhood Oral Health: A toolkit for District Health Boards, primary health care and public health providers and for oral health services relating to infant and preschool oral health</b>. Wellington: Ministry of Health. <a href="http://www.health.govt.nz/system/files/documents/publications/early-childhood-oral-health-a-toolkit-feb08.pdf">http://www.health.govt.nz/system/files/documents/publications/early-childhood-oral-health-a-toolkit-feb08.pdf</a></p> <p>The key objective of this toolkit for policy makers, funders, managers, clinical leaders and clinicians is to suggest a strategy of identifying children at greatest risk and targeting finite resources to those with the greatest need in order to reduce inequalities (while still maintaining universal access for all infants and pre-school children.) It recommends that Well Child/Tamariki Ora and other non-oral health providers conduct an enrolment and risk assessment process for all children at between 9 and 12 months of age and facilitate early contact with an oral health provider for examination and preventive and treatment services (if necessary) for those identified at highest risk of early childhood caries. This will require the development of a risk assessment tool (“Lift the Lip”) and training for non-oral health providers.</p>
<b>New Zealand guidelines</b>
<p>New Zealand Guidelines Group. 2009. <b>Guidelines for the Use of Fluorides</b>. Wellington: Ministry of Health. <a href="http://www.health.govt.nz/system/files/documents/publications/guidelines-for-the-use-of-fluoride-nov09.pdf">http://www.health.govt.nz/system/files/documents/publications/guidelines-for-the-use-of-fluoride-nov09.pdf</a></p> <p>These evidence-based best practice guidelines are aimed at providers of oral health care. They are based on a 2006 Australian guideline, a systematic review of international literature published since 2006 (RCTs and systematic reviews only) and relevant New Zealand research. They are not fully evidence-based guidelines (since the available evidence was not systematically and critically appraised and the recommendations are not accompanied by grades indicating the quality of the evidence on which they are based) but they are very well referenced. They deal with the use of topical fluoride treatments (including toothpastes, mouthrinse, varnishes, gels and foams) and fluoride tablets, but not water fluoridation or dietary fluoride intake. A fluoride algorithm is provided as a summary of the guidelines.</p>



New Zealand Dental Association. 2008. **Healthy Smile, Healthy Child: Oral Health Guide for Well Child Providers.** Auckland: New Zealand Dental Association. [http://www.healthysmiles.org.nz/assets/pdf/HealthySmilesBooklet-3rdEdition\\_sml.pdf](http://www.healthysmiles.org.nz/assets/pdf/HealthySmilesBooklet-3rdEdition_sml.pdf)

This publication is a training curriculum and guide for Well Child/Tamariki Ora providers. It aims to reduce oral health inequality by giving Well Child service providers the knowledge and understanding to provide families with early anticipatory guidance about the prevention of Early Childhood Caries (ECC).

#### International guidelines

Scottish Intercollegiate Guidelines Network (SIGN). 2014. **Dental interventions to prevent caries in children.** Edinburgh: Scottish Intercollegiate Guidelines Network. <http://www.sign.ac.uk/pdf/SIGN138.pdf>

This guideline is intended for healthcare professionals providing oral health advice to children in a one-to-one situation. It is based on a systematic review of the research evidence (2000–2011) relating to 12 key questions. Recommendations in the guideline are accompanied by letter grades indicating the strength of the evidence on which they are based. The key recommendations are: All children should be advised to brush twice daily with fluoride toothpaste, fluoride varnish should be applied twice yearly in all children, and resin-based fissure sealants should be applied to children's permanent molars as soon after eruption as practicable.

A short summary of the main recommendations in this guideline can be found in the quick reference guide: <http://www.sign.ac.uk/pdf/QRG138.pdf>

Irish Oral Health Services Guideline Initiative. 2012. **Oral Health Assessment: Best practice guidance for providing an oral health assessment programme for school-aged children in Ireland.** <http://www.ucc.ie/en/media/research/ohsrc/OralHealthAssessmentFull.pdf>

This evidence-based guideline is intended for those involved in planning and providing public dental services for children and adolescents in Ireland, where the Health Service Executive has statutory responsibility to make dental services available to children under the age of 16, free of charge. It covers best practice for conducting oral health assessments (OHAs), the timing, frequency and appropriate setting of OHAs for school-aged children, the cost-effectiveness of conducting OHAs in the school and in the clinic, and data collection and audit. It does not cover treatment of conditions identified during OHAs. The recommendations in the guideline are accompanied by letter grades indicating the strength of the evidence on which they are based (using the SIGN grading system).

Adewale L, Morton N, Blayney M. 2011. **Guidelines For The Management Of Children Referred For Dental Extractions Under General Anaesthesia** London: Association of Paediatric Anaesthetists of Great Britain and Ireland. <http://www.rcoa.ac.uk/system/files/PUB-DentalExtractions.pdf>

These evidence-based guidelines address 12 “key questions” relating to anaesthesia for children and young people who may require general anaesthesia for dental extractions. They cover assessment and preparation, how to reduce the requirement for general anaesthesia (especially, repeat general anaesthesia) for dental care, minimum standards for staff seniority and competencies, perioperative monitoring, anaesthetic techniques and regimens, staffing and equipment levels, discharge criteria, and procedures and advice about post-operative care following discharge. Levels of evidence and recommendations are graded using the SIGN methodology.

Scottish Dental Clinical Effectiveness Programme; a division of the NHS. 2010. **Prevention and Management of Dental Caries in Children: Dental Clinical Guidance.** Dundee: Scottish Dental Clinical Effectiveness Programme. <http://www.sdcep.org.uk/index.aspx?o=2858>

This detailed guidance is intended for practitioners providing primary dental care to children, from birth until the age of 16 years. It includes advice on: assessment of the child; delivery of preventive care according to caries risk, choosing the appropriate caries management option; delivery of restorative care; recall and referral; providing additional; support; and management of suspected dental neglect.

A summary version of this guidance can be downloaded here: <http://www.sdcep.org.uk/index.aspx?o=2865>, and number of supporting tools to assist dental professionals to follow the guidance recommendations can be downloaded here: <http://www.sdcep.org.uk/index.aspx?o=2865>.

Irish Oral Health Services Guideline Initiative. 2010. **Pit and Fissure Sealants: Evidence-based guidance on the use of sealants for the prevention and management of pit and fissure caries.** <http://www.ucc.ie/en/media/research/ohsrc/PitandFissureSealantsFull.pdf>

This guideline covers the use of pit and fissure sealants for the prevention and management of caries in the pits and fissures of primary and permanent teeth in children, adolescents and adults. It is based on three source guidelines (from the American Dental Association, the CDC and the Haute Autorité de Santé) together with systematic reviews, clinical trials and economic evaluations, published between 2004 and February 2010, which could be used to update these guidelines, and also a separate literature review of systematic and narrative reviews relating to caries detection methods and adverse effects of pit and fissure sealants. Recommendations are accompanied by letter grades indicating the strength of the evidence on which they are based. The evidence tables for this guideline are available here: <http://www.ucc.ie/en/media/research/ohsrc/PitandFissureSealantsEvidenceTables.pdf>, and the methodology supplement, here: <http://www.ucc.ie/en/media/research/ohsrc/PitandFissureSealantsMethodologySupplement.pdf>.

Irish Oral Health Services Guideline Initiative. 2009. **Strategies to prevent dental caries in children and adolescents: Evidence-based guidance on identifying high caries risk children and developing preventive strategies for high caries risk children in Ireland (Full guideline).**

<http://www.ucc.ie/en/media/research/ohsrc/PreventDentalCariesFull.pdf>

This guideline was developed for the public dental service in Ireland. It covers approaches to identifying “high caries risk” children, both at the individual and the population level, and effective caries prevention strategies in these children, both at the individual and the population level. Recommendations are accompanied by letter grades indicating the strength of the evidence on which they are based (using the SIGN grading system). A summary of the guideline can be found here: <http://www.ucc.ie/en/media/research/ohsrc/PreventDentalCariesSummary.pdf> and the evidence tables on which the guideline was based, here:

<http://www.ucc.ie/en/media/research/ohsrc/PreventDentalCariesEvidenceTables.pdf>

**Recent evidence-based medicine reviews**

The American Dental Association (ADA) Council on Scientific Affairs. 2013. **Topical fluoride for caries prevention**  
ADA Center for Evidence-Based Dentistry.

[http://ebd.ada.org/contentdocs/Topical\\_fluoride\\_for\\_caries\\_prevention\\_2013\\_update\\_-\\_full\\_manuscript.pdf](http://ebd.ada.org/contentdocs/Topical_fluoride_for_caries_prevention_2013_update_-_full_manuscript.pdf)

These clinical recommendations from the American Dental Association, which are an update of 2006 recommendations, are based on a systematic review of 71 trials, reported in 82 articles, assessing the efficacy of various topical caries-preventive agents. Articles included in the review were published in English and listed in either PubMed or the Cochrane library. Included trials were prospective controlled clinical studies in humans, either randomised or non-randomised, of fluoride agents requiring professional application or prescription, that reported caries incidence, arrest or reversal as outcome measures. When possible, meta-analysis was used to combine results of studies. The review panel concluded that there was evidence for the efficacy of some agents for preventing and controlling tooth decay. These agents included 2.26% fluoride varnishes, 1.23% fluoride gels, prescription-strength, home-use 0.5% fluoride gels/pastes, and prescription-strength, home-use 0.09% fluoride mouthrinses. The evidence indicated that 0.1% fluoride varnishes or prophylaxis pastes containing fluoride were not efficacious for preventing tooth decay. There was insufficient evidence on the efficacy or otherwise of 1.23% fluoride foams. The review authors noted that many trials had been conducted many years ago when background fluoride exposures in the general population were lower (due to lack of water fluoridation and toothpastes being fluoride free) and that by modern standards the quality of many studies was sub-optimal. Most studies did not report on arrest or reversal of caries.

Chou R, Cantor A, Zakher B, et al. 2013. **Preventing Dental Caries in Children <5 Years: Systematic Review Updating USPSTF Recommendation.** Pediatrics, 132(2), 332–50.

<http://pediatrics.aappublications.org/content/132/2/332.abstract>

This review was commissioned by the USPSTF to update its previous (2004) recommendations on the prevention of dental caries in children < 5 years of age. The review included both trials and observational studies, identified through searches of Medline and the Cochrane library. There were no studies on the effects of screening by primary care providers on clinical outcomes. On good-quality cohort study found that examination by a paediatrician was associated with a sensitivity of 0.76 for detecting a child with caries. There were no new trials of fluoride supplementation. There were three new trials of fluoride varnish which found that it was more effective than no fluoride varnish (reduction in caries increment of 18 to 59%). There were three trials of xylitol with inconclusive results regarding its effect on caries. Five new observational studies were consistent with previous evidence in finding an association between early childhood fluoride use and dental fluorosis. The review authors found no evidence on the accuracy of risk prediction instruments in primary care settings. They concluded that there was no direct evidence that screening by primary care clinicians is effective at reducing childhood caries but that new evidence supports the use of fluoride varnishes in high-risk children and evidence reviewed in earlier USPSTF reviews indicated that oral fluoride supplementation is effective in reducing caries incidence.

Hujoel PP. 2013. **Vitamin D and dental caries in controlled clinical trials: systematic review and meta-analysis.** Nutrition Reviews, 71(2), 88–97.

The author of this review notes that, in the two decades following discovery of vitamin D on dental caries, but that in recent times the possible association between vitamin D and dental caries has largely been ignored. His systematic review included 24 controlled clinical trials involving a total of 2,827 children. Twenty-two of the trials were conducted more than fifty years ago, and, by modern standards most of them have a variety of methodological shortcomings. The two other trials, both of which compared UV therapy to no UV therapy, were published in 1975 and 1989. Using random-effects and meta-regression models, the pooled relative-rate estimate of supplemental vitamin D was found to be 0.53 (95% CI 0.43–0.65). There were no robust differences found between the caries-preventive effects of vitamin D<sub>2</sub>, vitamin D<sub>3</sub> and ultraviolet radiation. The author stated that his analysis identified vitamin D as a promising caries-preventive agent, leading to a low-certainty conclusion that vitamin D may reduce the incidence of dental caries. This review was assessed by the CRD. Their commentary stated that, “Overall, the author’s cautious conclusions reflect the limitations of the data and appear to be appropriate”. The CRD commentary can be found here:

[http://www.crd.york.ac.uk/CRDWeb/ShowRecord.asp?AccessionNumber=12013012303&UserID=0#.U17ES\\_mSx8E](http://www.crd.york.ac.uk/CRDWeb/ShowRecord.asp?AccessionNumber=12013012303&UserID=0#.U17ES_mSx8E)

The American Dental Association (ADA) Council on Scientific Affairs. 2011. **Non-fluoride caries preventive agents: Full report of a systematic review and evidence-based recommendations** Chicago: ADA Center For Evidence Based Dentistry.

[http://ebd.ada.org/contentdocs/clinical\\_recommendations\\_non\\_fluoride\\_caries\\_preventive\\_agents\\_full\\_report.pdf](http://ebd.ada.org/contentdocs/clinical_recommendations_non_fluoride_caries_preventive_agents_full_report.pdf)

This review aimed to evaluate studies of non-fluoride caries-preventive agents on the market in the US. The review authors stated that the use of fluoridated toothpastes, fluoridated municipal water, other topically applied fluorides and pit and fissure sealants, together with dietary improvement, remain mainstays of caries management and that non-fluoride agents may serve as adjunctive therapies for preventing, arresting or even reversing dental caries. The non-fluoride agents evaluated were: sucrose-free polyol chewing gums, xylitol dentifrices, chlorhexidine, chlorhexidine in combination with thymol, calcium-containing agents, phosphate-containing agents, casein derivatives, sialogogues, iodine and triclosan. Altogether the review considered 71 published articles, describing 50 RCTs and 15 non-randomised studies, assessing the benefits of various non-fluoride caries preventive agents. The review panel recommended sucrose-free chewing gum (containing either xylitol only or polyol combinations) or xylitol lozenges for caries prevention. They also found that a 1:1 mixture of chlorhexidine/thymol varnish may be efficacious in the prevention of root caries.

Berg J, Gerweck C, Hujuel PP, et al. 2011. **Evidence-Based Clinical Recommendations Regarding Fluoride Intake From Reconstituted Infant Formula and Enamel Fluorosis: A Report of the American Dental Association Council on Scientific Affairs.** The Journal of the American Dental Association, 142(1), 79–87.

<http://jada.ada.org/content/142/1/79.abstract>

The fluoride content of infant formula depends largely on the fluoride content of the water use to reconstitute it since the powdered concentrate typically contains only low concentrations of fluoride. Human breast milk normally has low levels of fluoride. These recommendations are based on one systematic review (see below) and two clinical studies. The systematic review was commissioned by the American Dental Association and it concluded that, based on the findings of 17 observational studies, in infants aged 0–24 months consumption of infant formula is associated with an increased risk of developing at least some detectable level of dental fluorosis (OR=1.81; 95% CI 1.44–2.26). Due to limited information provided by the studies included in this review, the review authors were unable to determine whether the increased risk of fluorosis was due to fluoride intake. The majority of guideline's expert panel concluded that parents and caregivers of infants up to 12 months should be advised to use optimally fluoridated drinking water when making up formula and that if they had concerns about dental fluorosis they could use ready-to-feed formula or make up formula using fluoride-free water.

The review on which this guideline is largely based is: Hujuel PP, Zina LG, Moimaz SAS, et al. 2009. **Infant Formula and Enamel Fluorosis: A Systematic Review.** The Journal of the American Dental Association, 140(7), 841–54. <http://jada.ada.org/content/140/7/841.abstract> .

Rozier RG, Adair S, Graham F, et al. 2010. **Evidence-Based Clinical Recommendations on the Prescription of Dietary Fluoride Supplements for Caries Prevention: A Report of the American Dental Association Council on Scientific Affairs.** The Journal of the American Dental Association, 141(12), 1480–89.

<http://jada.ada.org/content/141/12/1480.abstract>

These evidence-based recommendations are based on three systematic reviews and two clinical studies published between May 18<sup>th</sup>, 2008 and Dec 11<sup>th</sup>, 2009. The expert panel concluded that fluoride supplements are effective in preventing caries but that because there have been increases in children's exposure to fluoride from multiple sources and increases in the prevalence of dental fluorosis, fluoride supplements are only recommended for children at high risk of developing dental caries. They suggest that clinicians use tools such as those developed by the ADA and the American Academy of Pediatric Dentistry to determine children's risk status.

Murdoch Children's Research Institute. 2009. **Maternal and Child Oral Health - Systematic Review and Analysis: a report for the New Zealand Ministry of Health.** Wellington: Ministry of Health.

<http://www.health.govt.nz/system/files/documents/publications/maternal-infant-oral-healthv2-aug09.pdf>

Early childhood caries (ECC) has its origins in the first year of life and so primary prevention interventions need to be implemented early, possibly before birth. The aim of this review was to report on the evidence regarding the effects of the oral health of pre- and post-natal women, particularly disadvantaged or marginalised women, on the oral health of their children. The review includes a survey of the literature on the aetiology of ECC, a review of New Zealand epidemiological data in relation to international data, a review of the current evidence on the impact of maternal oral health on child oral health and a review of the effectiveness of current and potential maternal health and oral health interventions in improving infant oral health outcomes through reducing ECC. It concludes with a summary of the findings and evidence-based recommended options for the Ministry to explore further. The review noted that at age five, Māori and Pacific children have more dental caries, and are less likely to be caries free than other children. The review found that there was no very strong evidence that the oral health of mothers is related to the oral health of their infants, but the available evidence was relatively consistent in indicating that a relationship existed. (A common weakness of the studies reviewed was that they examined only the infants' oral health, assessing the mothers' oral health by self-report.) There was moderate evidence for the benefits of primary prevention programs which aim to reduce dental caries in children by improving the oral health of mothers.

Azarpazhooh A, Main PA. 2009. **Efficacy of dental prophylaxis (rubber cup) for the prevention of caries and gingivitis: a systematic review of literature.** British Dental Journal, 207(7), E14; discussion 328–9

Dental prophylaxis typically involves placing pumice or an abrasive paste in a rubber cup and applying the paste to the teeth using a rotating rubber cup at low speed. The purpose of this review was to assess the efficacy of routine dental prophylaxis before professionally applied topical fluoride (PATF) or at regular recall visits for the prevention of caries or gingivitis. The review authors identified only six original studies meeting their inclusion criteria. Four studies all demonstrated that dental prophylaxis is not warranted before PATF for caries prevention in children. Two other studies failed to provide evidence of any benefit of dental prophylaxis at recall examination for gingivitis prevention. The review authors concluded that the clinical implication of their findings was that dental prophylaxis need not be provided at either recall visits or before PATF for the prevention of caries in children and that dental prophylaxis at intervals of four months or more is not warranted for the prevention of gingivitis in the general population.

#### Recent Cochrane reviews

The Cochrane collection contains 40 reviews relating to the prevention and management of dental caries. Links to the more recent reviews relating to prevention of dental caries in children, with a very brief summary of the main message of each review are presented below.

[Antibacterial agents in composite restorations for the prevention of dental caries](#) (2013)

No RCTs were identified, therefore no evidence was found to support the use of antibacterial agents in fillings.

[Fluorides for the prevention of early tooth decay \(demineralised white lesions\) during fixed brace treatment](#) (2013)

[Three relevant studies \(458 participants\) were identified. Based on the findings of one study, there is some “moderate” evidence that fluoride varnish applied every six weeks \(at the time of orthodontic review during treatment\) is effective.](#)

[Fluoride varnishes for preventing dental caries in children and adolescents](#) (2013)

There is a large body of moderate quality evidence (22 trials with 12,455 participants, 9595 of whom had their data used in the review’s analyses) indicating that fluoride varnish has a substantial caries-inhibiting effect in both primary and permanent teeth.

[Interdental brushing for the prevention and control of periodontal diseases and dental caries in adults](#) (2013)

Seven studies (354 participants analysed) were included in this review. There was very low-quality evidence from one study that toothbrushing plus interdental brushing led to reduced gingivitis and plaque at one month compared to toothbrushing alone. There was also low-quality evidence from seven studies that, at one month only, interdental brushing reduced gingivitis more than flossing. There was not enough evidence to determine whether interdental brushing reduced or increased plaque levels compared to flossing.

[Primary school-based behavioural interventions for preventing caries](#) (2013)

This review included four RCTs (2302 children) of interventions aimed at changing behaviour relating to toothbrushing and the consumption of cariogenic foods. The review authors found insufficient evidence that the interventions are efficacious at reducing caries but some limited evidence that they may improve plaque outcomes and increase children’s oral health knowledge.

[Sealants for preventing dental decay in the permanent teeth](#) (2013)

There were 34 RCTs in children aged 5–16 years, 12 (2575 participants) comparing sealant to no sealant, and 21 (3202) comparing one sealant with another. The review authors conclude that sealing the occlusal surfaces of children’s permanent molars reduces caries

[One-to-one dietary interventions undertaken in a dental setting to change dietary behaviour](#) (2012)

Five relevant RCTs were found. Only one, the largest study with 497 11–12 year olds, involved children. The review authors conclude that there was some evidence that these interventions can change behaviour although the evidence was stronger for interventions aimed at increasing fruit and vegetable consumption and decreasing alcohol consumption than for those aiming to reduce dietary sugar consumption.

[Fluoride supplements \(tablets, drops, lozenges or chewing gums\) for preventing dental caries in children](#) (2011)

There was moderate quality evidence that fluoride supplements reduce caries increment on permanent tooth surfaces (3 RCTs, 1240 participants, relative effect 0.24, 95% CI 0.16–0.33) and in permanent teeth (3 RCTs, 1208 participants, relative effect 0.29, 95% CI 0.19–0.39). The evidence regarding the effects of supplements on deciduous teeth and on fluorosis (an adverse effect) was unclear. Moderate quality evidence indicated no difference between the effects of topical fluoride and fluoride supplements in either permanent teeth (5 studies, 2047 participants) or deciduous teeth (2 studies, 1051 participants).

Older Cochrane review relating to prevention can be found here:

<http://www.thecochranelibrary.com/details/browseReviews/577889/Prevention.html> and reviews relating to treatment can be found here: <http://www.thecochranelibrary.com/details/browseReviews/577887/Treatment.html>

#### Websites and other relevant publications

American Academy of Pediatric Dentistry. **2013–14 Definitions, Oral Health Policies, and Clinical Guidelines.**  
<http://www.aapd.org/policies/> accessed April 2014.

This website provides links to the many clinical guidelines of the American Academy of Pediatric Dentistry (AAPD), and also links to the AAPD's oral health policies, endorsements, and other resources.

Harris JC, Balmer RC, Sidebotham PD. 2009. **British Society of Paediatric Dentistry: a policy document on dental neglect in children.** Int J Paediatr Dent. DOI: 10.1111/j.1365-263X.2009.00996.x

Dental neglect can be defined as the persistent failure to meet a child's basic oral health needs, likely to result in serious impairment of a child's oral or general health or development. This policy document from the British Society of Paediatric Dentistry provides guidance on this issue.

Note: The publications listed were identified using the search methodology outlined in Appendix 1.