

Child Use of Dental Services and Receipt of Dental Care in New Zealand

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INTRODUCTION

Despite marked oral health improvements in the overall child population of many developed countries in the last three decades, it is becoming increasingly clear that a small proportion of children in such countries carry a disproportionate share of the dental disease burden (Willems et al., 2005). There is indisputable evidence that demographic (Hunter et al., 1992), socio-economic (Pattussi et al., 2001), physical/lifestyle (Pertersen, 2004), environmental (Whelton et al., 2004) and dietary (Bruno-Ambrosius et al., 2005; Harris et al., 2004) factors have a substantial impact on these oral health disparities. The role of food security (the ready availability of nutritionally adequate foods and ability of people to acquire personally acceptable foods in a socially acceptable way (Ministry of Health, 2003a)) on child dental health outcomes is a less explored paradigm, but one that may be a useful proxy measure of socio-economic status (SES) when investigating groups for whom more traditional SES instruments (for example; education, occupation and income) are culturally inappropriate (Struthers et al., 2005). It is important that pathways through which these factors may influence child oral health are explored so that appropriate interventions may be designed and implemented.

Children in New Zealand belong to a wide range of ethnic groups (Ministry of Health, 2005a). The most prevalent are New Zealand European or Other (NZEO; 66.2 percent of 0–14 year old population), followed by Māori (the Indigenous group; 23.2 percent of child population) and Pacific (Cook Island, Western Samoan, Niuean, Tongan, Tuvaluan, Tokelaun and Fijian) children (10.6 percent of child population) (Statistics New Zealand, 2002). Māori and Pacific children do not enjoy the same social advantage as their NZEO counterparts, with over sixty percent of Māori or Pacific children living in government-subsidised housing and one third of Māori or Pacific adults receiving a benefit (Statistics New Zealand, 2002). Maori and Pacific children do also not fare well

in terms of general health, with higher rates of hospitalisation (particularly for acute rheumatic fever or pneumonia) than NZEO children and fetal death rates almost double the national average.

Dental services for children in New Zealand are provided through the School Dental Service (SDS), which was established in 1921 and has been attributed, along with exposure to fluoride and increased public awareness, to the marked reduction in untreated dental decay in the child population since the beginning of last century (Cutrees and Hunter, 1992). Some 97 percent of the 4–13-year old population are currently enrolled (Ministry of Health, 20/09/05). Dental therapists employed by the SDS perform a range of services, without fee, in school-based dental clinics, including provision of restorations to primary and permanent teeth, and pulp treatments and extractions to primary teeth (Ministry of Health, 2005b). Disparities in SDS enrolment and service provision do exist, however, with children from socially-disadvantaged or minority groups being those least likely to benefit from the service (Ministry of Health, 2003b).

The 2002 National Children's Nutrition Survey (CNSO2) was a cross-sectional study of a representative sample of Maori, Pacific and NZEO children that aimed to explore the impact of various material and behavioural factors on a range of child health outcomes. The oral health outcomes included 6 items pertaining to use of dental services and self-reported oral health. The aim of this paper is to present background information on the CNSO2 and to identify associations at a bivariate level between use of dental services and receipt of dental care among children involved in the study with socio-demographic, household, physical/lifestyle, dietary, food security and other oral health factors.

METHODS

The CNSO2 employed a two-stage sampling frame; the first stage involved selecting 172 schools with equal probability from throughout

New Zealand and the second stage involved randomly sampling children from these schools in proportion to the total number of enrolled students. Different sampling ratios were used for Māori, Pacific and NZEO children to ensure approximately equal numbers of children from each ethnic group in the final survey sample. Children were selected according to the following sampling proportions: Maori 0.161, Pacific 0.410 and NZEO 0.050. Sampling proportions included an inflation factor to allow for a 70 percent response rate. Allowing for a design effect of 1.7 from weighting caused by differential ethnic sampling proportions and 1.5 for school-based clustering (estimated from previous New Zealand school-based surveys), a sample of 1000 from each ethnic group was recruited under the study design. This is approximately equivalent to 400 recruited by simple random sampling, meaning the predicted standard error around a proportion of 50 percent was 2.5 percent.

To account for the complex sample design, each participant (or sample unit) was allocated a survey weight to indicate how many population units were represented by a single child. The purpose of weighting was to produce estimates that would have been obtained had the entire eligible child population been surveyed. The method used to calculate weights has been described elsewhere (Ministry of Health, 2003a).

Consent forms and a cover letter explaining the study were sent home with each eligible child. The forms stressed that child and care-giver involvement was voluntary, and that participants could withdraw from the study at any stage with no consequent effect on their health care. Ethical approval was received from all 13 regional health ethics committees in New Zealand.

The survey employed a number of instruments to obtain data: a computer-based home interview that contained items pertaining to socio-demographic information, food intake, food habits, physical activity, food security and dental health; a food-frequency questionnaire; and physical measures such as weight and height to obtain body mass index (BMI) values. Care-givers were requested to convey the information for children aged 5–9 years while children aged 10–14 years completed the questionnaires themselves. Care-givers completed all items pertaining to household income and food security.

The dental items were based on those used in previous studies (Hinds and Gregory, 1995;

Silva and Stanton, 1996) and focus group methodology was used to test the appropriateness of the items with Māori and Pacific children (Thomson and Drummond, 2001). The dental items were also clinically validated (Jamison et al., 2004). Questions pertaining to use of dental services included 'do you/does your child go to the school dental clinic or a dentist?' with the response options being 'yes', 'no', 'can't remember' and 'don't know'. 'Irregular dental attendance' was defined as a 'no' response to this item. Items pertaining to restoration receipt included 'have you/has your child ever had a restoration or dressing?' while the question exploring extraction receipt was 'have you/has your child ever had a tooth (or teeth) taken out because of a hole (tooth decay), a 'gum-boil' (abscess) or infection?' Participants were asked to provide one of four answers to the latter two items: 'yes', 'no', 'can't remember' and 'don't know'.

The NZDep01 index of deprivation was used to assess SES. This is a measure that combines socio-economic variables from the 2001 Census to reflect eight domains of deprivation (income, access to a car, living space, home ownership, employment, qualifications, support and access to a telephone) and provides a deprivation score for each meshblock in New Zealand (meshblocks are geographical units defined by Statistics New Zealand, containing a median of 87 people) (Salmond, and Crampton, 2002). The scale ranges from 1 to 10, but, for the purposes of this study, the categories were collapsed into quintiles; I defined as children living in the least deprived areas (scores 1 and 2) and V as children in the most deprived areas (scores 9 and 10).

Statistical analyses were carried out using the complex sampling module in SPSS 13.0. This software package takes into account the clustered sampling design to yield unbiased standard error estimates and design effects. In the tables, all percentages are weighted so that characteristics of children in the sample represent those of the New Zealand child population (counts are unweighted). Levels of statistical significance were set at $P < 0.05$ and the Pearson Chi-square test was used to compare differences between categorical variables.

RESULTS

The total number of children recruited in the 172 schools was 4728 and 3275 of these

completed all aspects of the survey (response rate = 69.3 percent). The response rate was similar for males (70.4 percent) and females (68.1 percent) and did not differ by age (5–6 years, 70.4 percent; 7–10 years; 69.0 percent; 11–14 years; 68.9 percent). There were response rate differences between ethnic groups, with 65.3 percent of sampled Māori children, 74.0 percent of sampled Pacific children and 69.8 percent of sampled NZEO children responding. The response rate was higher among children in rural schools (74.5 percent) than those attending urban schools (68.4 percent).

Socio-demographic Characteristics: Of the 3275 children included in the analyses, 1224 (37.4 percent) were Māori, 1058 (32.3 percent) were Pacific and 993 (30.3 percent) were NZEO (Table 1). Higher proportions of children aged 11–14-years, who were Pacific or who had not always lived in New Zealand utilised dental services irregularly. More children who were older, Māori or with an annual household income of less than \$20,000 reported having received a restoration, while a higher proportion of Pacific children, those living in the most disadvantaged areas or those with low house-hold income reported having received a dental extraction.

Household Characteristics: A higher proportion of children who lived in a flat or hostel, or whose care-givers did not own the place of residence were irregular dental attenders (Table 2). A higher proportion of children who lived in privately rented households, in residences that housed 4+ children, had no children aged <5 years or had a household food expenditure of <\$100 per week had received a restoration. There were no significant associations between household characteristics and children having received an extraction.

Physical and Lifestyle Characteristics: Watching television for 2+ hours the previous Saturday, watching television 1–2 school days a week, watching television for 2+ hours on a school day, not playing computer games on a school day and not playing tag or similar the previous week were associated with irregular dental attendance (Table 3). A higher proportion of children who watched television 3–4 school days a week, who played a computer game the previous week or who played computer games on school days had received a restoration. Having received an extraction was associated with having a medical or physical disability.

Dietary Characteristics: Never having

breakfast before school, eating breakfast on the way to school, buying lunch at a dairy (a small shop selling convenience food), purchasing lunch at school, consuming a chocolate bar or Coca-Cola® 4+ times the previous month and adding sugar to tea or coffee were all associated with irregular dental attendance (Table 4). Associations with restoration receipt were found among children who never ate breakfast before school, ate breakfast on the way to school, bought lunch at a dairy or school canteen, consumed a chocolate bar, sweets, Coca-Cola® or another soft-drink 4+ times the previous month or added sugar to milo, tea or coffee. A higher proportion of children who bought their lunch at a dairy or who consumed sweets or Coca-Cola® 4+ times the previous month had received a dental extraction.

Food Security Characteristics: Irregular dental attendance was associated with those in the house being sometimes unable to afford to eat properly, running out of food due to lack of money, using food grants when money ran out, being stressed because of not having enough money for food or feeling stressed because the household could not provide the food they wanted for social occasions (Table 5). Restoration receipt was associated with sometimes running out of food due to money shortages, having to eat less because of lack of money or feeling stressed because of not having enough money for food. A higher proportion of children in households who sometimes did not have enough food due to financial shortages, had to eat less because of lack of money, ate an unvaried diet due to money shortages, or felt stressed because of not having enough money for food or when they couldn't provide the food they wanted for social occasions reported having received a dental extraction.

Dental Care Characteristics: A higher proportion of children who did not utilize dental services had not received a restoration, extraction or experienced dental pain at night (Table 6). Having received a restoration was associated with having received dental care before, having received an extraction, having experienced dental pain at night and having undergone dental care under a general anaesthetic. A higher proportion of children who had received an extraction had received dental care before, had received a restoration, had experienced dental pain at night or had received a dental general anaesthetic.

Table 1: Use of dental services and receipt of dental care by socio-demographic characteristics

	<i>Total N (column %)</i>	<i>Irregular dental atten- dance N (row %)</i>	<i>Receipt of resto- ration N (row %)</i>	<i>Receipt of extra- ction N (row %)</i>
<i>Age-group</i>				
5-6 years	692 (21.1)	45 (6.6) ^a	310 (42.6) ^a	100 (12.3)
7-10 years	1425 (43.5)	51 (3.0)	954 (64.4)	284 (16.7)
11-14 years	1158 (35.4)	184 (11.8)	854 (74.3)	181 (14.2)
<i>Gender</i>				
Male	1697 (51.8)	148 (7.5)	1082 (62.5)	292 (15.6)
Female	1578 (48.2)	132 (6.9)	1036 (65.8)	273 (14.1)
<i>Ethnicity</i>				
Māori	1224 (37.4)	92 (9.0) ^a	886 (73.8) ^a	212 (16.7) ^a
Pacific	1058 (32.3)	132 (12.0)	625 (59.2)	215 (20.5)
NZEO	993 (30.3)	56 (6.0)	607 (61.3)	138 (13.5)
<i>School</i>				
Urban	2792 (85.3)	258 (7.7)	1774 (63.1)	484 (14.8)
Rural	483 (14.7)	22 (5.1)	344 (68.3)	81 (15.0)
<i>NZDep01</i>				
I (least dep)	300 (10.1)	15 (4.8)	188 (61.4)	41 (13.0) ^b
II	367 (12.3)	23 (5.3)	229 (62.0)	54 (13.0)
III	392 (13.1)	37 (8.4)	264 (61.9)	65 (14.8)
IV	553 (18.5)	53 (9.9)	361 (64.4)	89 (13.8)
V (most dep)	1370 (45.9)	134 (9.2)	873 (66.1)	270 (18.8)
<i>Income</i>				
<\$20,000	577 (21.4)	53 (7.9)	379 (71.5) ^a	123 (19.1) ^b
\$20-50,000	1210 (44.8)	94 (7.2)	777 (65.5)	217 (15.6)
\$50,000	912 (33.8)	46 (5.1)	556 (57.6)	127 (12.8)
<i>Live in NZ</i>				
Always	2811 (85.8)	227 (6.1) ^a	1829 (64.8)	489 (15.2)
Not always	464 (14.2)	53 (14.3)	289 (60.2)	76 (12.5)

^aChi-Square P<0.001^bChi-Square P<0.05**Table 2: Use of dental services and receipt of dental care by household characteristics**

	<i>Total N (column %)</i>	<i>Irregular dental atten- dance N (row %)</i>	<i>Receipt of resto- ration N (row %)</i>	<i>Receipt of extra- ction N (row %)</i>
<i>Residential</i>				
Live in town house	3093 (94.4)	253 (6.6) ^a	2006 (64.2)	528 (14.8)
Live in other (flat, hostel)	182 (5.6)	27 (19.2)	112 (63.4)	37 (16.4)
<i>Rental</i>				
Rent private	836 (25.5)	79 (9.4) ^b	575 (68.5) ^a	153 (15.9)
Own	1736 (53.0)	116 (6.1)	1121 (62.8)	271 (13.9)
Other (relatives)	703 (21.5)	85 (9.7)	422 (63.1)	141 (18.7)
<i>Bedrooms</i>				
1-2 rooms	319 (9.7)	37 (11.3)	210 (66.4)	59 (13.3)
3-4 rooms	2594 (79.2)	214 (6.8)	1662 (63.4)	429 (14.7)
4+ rooms	362 (11.1)	29 (6.6)	246 (67.7)	77 (17.4)
<i>Adults</i>				
1 adult	401 (12.2)	34 (9.0)	266 (68.2)	72 (14.8)
2 adult	1884 (57.5)	152 (6.7)	1215 (62.8)	320 (14.4)
3+ adult	990 (30.2)	94 (7.8)	637 (66.1)	173 (16.2)
<i>Children</i>				
1 child	623 (19.0)	50 (8.1)	401 (60.8) ^a	110 (14.0)
2 children	1162 (35.5)	95 (7.2)	742 (62.9)	193 (15.1)
3 children	800 (24.4)	59 (5.7)	508 (65.0)	140 (15.5)
4+ children	690 (21.1)	76 (8.9)	467 (71.5)	122 (14.4)
<i><5-year-old Children</i>				
none	1887 (57.6)	169 (7.4)	1266 (66.5) ^b	305 (14.9)
one	828 (25.3)	69 (6.5)	513 (57.6)	137 (13.4)
two	560 (17.1)	42 (7.3)	339 (62.4)	123 (17.4)
<i>Food Cost Per Week</i>				
<\$100	473 (15.6)	48 (9.4)	320 (70.2) ^a	99 (17.9)
\$1-200	1719 (56.7)	128 (6.5)	1086 (62.0)	285 (15.2)
\$200+	840 (27.7)	61 (6.2)	534 (62.6)	137 (13.1)

^aChi-Square P<0.001^bChi-Square P<0.01^cChi-Square P<0.05

Table 3: Use of dental services and receipt of dental care by physical and lifestyle characteristics

	Total N (column %)	Irregular dental atten- dance N (row %)	Receipt of restor- ation N (row %)	Receipt of extrac- tion N (row %)
<i>Disability</i>				
Yes	905 (27.6)	70 (6.8)	596 (64.0)	176 (17.3) ^a
No	2370 (72.4)	210 (7.4)	1522 (64.2)	389 (13.9)
<i>BMI</i>				
Normal	1743 (57.2)	119 (6.7)	1137 (63.0)	300 (14.3)
Overweight	789 (25.9)	78 (7.5)	505 (66.2)	146 (14.7)
Obese	517 (17.0)	56 (9.3)	335 (68.0)	77 (17.4)
<i>Hours Watched TV Last Saturday</i>				
<2 hours	1261 (38.5)	67 (4.9) ^a	785 (62.9)	204 (14.8)
2-4 hours	1411 (43.1)	144 (9.0)	940 (65.3)	249 (14.8)
4+ hours	603 (18.4)	69 (8.5)	393 (64.1)	112 (15.0)
<i>How Many School Days Watch TV</i>				
5 days	2397 (73.2)	175 (6.1) ^b	1577 (65.3) ^a	428 (15.6)
3-4 days	400 (12.2)	45 (9.6)	265 (66.1)	65 (14.3)
1-2 days	478 (14.6)	60 (10.5)	276 (56.8)	72 (12.0)
<i>How Many Hours Watch TV On School Day</i>				
<2 hours	1933 (59.0)	143 (6.3) ^c	1209 (62.9)	312 (14.1)
>2 hours	1342 (41.0)	137 (8.7)	909 (66.1)	253 (16.1)
<i>Played Computer Game Last Week</i>				
Yes	1672 (51.1)	132 (7.4)	1121 (66.4) ^a	281 (15.6)
No	1603 (48.9)	148 (7.0)	997 (61.2)	284 (13.9)
<i>Play Computer Games On School Days</i>				
Yes	1080 (64.6)	65 (5.5) ^a	744 (69.7) ^b	185 (15.8)
No	592 (35.4)	67 (11.2)	377 (60.0)	96 (15.3)
<i>How Many School Days Do Play Computer Games</i>				
5 days	298 (9.1)	24 (7.6)	214 (71.0)	46 (14.0)
3-4 days	314 (9.6)	18 (4.4)	209 (66.8)	54 (16.5)
1-2 days	2663 (81.3)	238 (7.5)	1695 (62.8)	465 (14.7)
<i>Play Tag, Bullrush, Skipping Last Week</i>				
No	1148 (35.1)	130 (10.4) ^c	778 (66.4)	182 (13.2)
Yes	2127 (64.9)	150 (5.1)	1340 (62.6)	383 (15.9)
<i>Play Other Active Games Last Week</i>				
No	2447 (74.7)	209 (7.2)	1593 (64.4)	409 (14.7)
Yes	828 (25.3)	71 (7.2)	525 (63.4)	156 (15.4)
<i>Walk, Ride, Skateboard To School</i>				
No	1350 (41.2)	120 (7.0)	879 (64.1)	224 (14.5)
Yes	1925 (58.8)	160 (7.4)	1239 (64.1)	341 (15.2)

^aChi-Square P<0.05^bChi-Square P<0.01^cChi-Square P<0.001

DISCUSSION

This cross-sectional investigation of a nationally-representative child sample from New Zealand showed that use of dental services and receipt of dental care were associated with socio-demographic, household, physical and lifestyle, dietary, food security and other dental characteristics at a bivariate level. The findings should be interpreted with a degree of caution, however, as confounding may have occurred which impact on the findings. Multivariate analyses addressing potential confounding will be presented in sub-sequent articles.

Ethnicity was associated with all three of the

dental dimensions explored, with Māori children having a higher prevalence of having received a restoration and Pacific children being more likely to not attend for regular dental care or to have received an extraction (Table 1). This was consistent with previous investigations in New Zealand that indicate that Māori and Pacific children are dentally disadvantaged in comparison with their NZEO counterparts (Silva and Stanton, 1996) and with findings from other countries that suggest that Indigenous children carry a disproportionate amount of the oral health burden (Peressini et al., 2004; Nash and Nagel, 2005).

It was interesting that eating breakfast on the

Table 4: Use of dental services and receipt of dental care by dietary characteristics

	Total N (column %)	Irregular dental atten- dance N (row %)	Receipt of restor- ation N (row %)	Receipt of extra- ction N (row %)
<i>Breakfast Before School</i>				
Usually	2335 (71.3)	145 (6.0) ^a	1500 (62.9) ^c	379 (14.5)
Sometimes	715 (21.8)	89 (11.3)	464 (69.7)	142 (17.5)
Never	225 (6.9)	46 (18.5)	154 (71.0)	44 (14.6)
<i>Breakfast on Way to School</i>				
Yes	842 (25.7)	93 (11.0) ^b	551 (68.0) ^c	179 (17.7)
No	2433 (74.3)	187 (6.5)	1567 (63.3)	386 (14.3)
<i>Lunch Bought Dairy</i>				
Yes	1192 (36.4)	135 (9.6) ^b	796 (69.4) ^b	229 (17.4) ^c
No	2083 (63.6)	145 (6.4)	1322 (62.3)	336 (14.0)
<i>Lunch Bought School</i>				
Yes	2058 (62.8)	208 (8.5) ^c	1387 (67.6) ^a	387 (16.1)
No	1217 (37.2)	72 (5.6)	731 (59.8)	178 (13.3)
<i>Apple Consumption Last Month</i>				
<3 times per month	454 (13.9)	134 (8.2)	294 (64.4)	72 (15.2)
>4 times per month	2821 (86.1)	146 (6.4)	1824 (64.1)	493 (14.8)
<i>Chocolate Bar Consumption Last Month</i>				
<3 times	1684 (51.4)	124 (6.1) ^b	1024 (59.8) ^a	271 (14.5)
>4 times	1591 (48.6)	156 (8.7)	1094 (69.9)	294 (15.3)
<i>Sweets Consumption Last Month</i>				
<3 times	1491 (45.5)	119 (6.6)	899 (60.6) ^b	223 (12.8) ^c
>4 times	1784 (54.5)	161 (7.8)	1219 (67.4)	342 (16.8)
<i>Coca-Cola® Consumption Last Month</i>				
<3 times	1523 (46.5)	103 (5.7) ^b	913 (59.8) ^a	225 (13.2) ^c
>4 times	1752 (53.5)	177 (9.1)	1205 (69.3)	340 (16.9)
<i>Other Soft-drink Consumption Last Month</i>				
<3 times	1460 (44.6)	103 (6.2)	893 (61.7) ^c	212 (14.1)
>4 times	1815 (55.4)	177 (8.3)	1225 (66.8)	353 (15.7)
<i>Add Sugar To Milk</i>				
Yes	1259 (38.4)	118 (8.2)	833 (68.5) ^b	218 (16.8)
No	2016 (61.6)	162 (6.8)	1285 (62.1)	347 (14.0)
<i>Add Sugar to Tea</i>				
Yes	1320 (40.3)	160 (11.9) ^a	890 (71.0) ^a	242 (15.9)
No	1955 (59.7)	120 (5.2)	1228 (61.2)	323 (14.4)
<i>Add Sugar to Coffee</i>				
Yes	688 (21.0)	107 (13.9) ^a	443 (70.0) ^c	117 (12.8)
No	2587 (79.0)	173 (6.1)	1675 (63.1)	448 (15.2)

^aChi-Square P<0.001^bChi-Square P<0.01^cChi-Square P<0.05

way to school had a negative association with all dental items, with the exception of extraction receipt (Table 4). There is no evidence in the literature of why this occurrence may have been observed. Buying lunch at a dairy was also negatively associated with use of dental services and receipt of dental care, possibly because children who purchase their lunch may have relative freedom to select what they like and favour high sugar content foods. Children who consumed generous amounts of Coca-Cola® were more likely to not attend for dental care, which is a concern given the high sugar content of this beverage. Unsurprisingly, a high prevalence of such children had also received a restoration or extraction. Increased availability of carbonated beverages is a serious risk factor for child obesity and diabetes, and policies to remove

vending machines containing such beverages from some New Zealand schools where child obesity levels are high has begun (Ministry of Health, 2005a). Eating on the run, buying lunch or frequently consuming Coca-Cola® could all be indicators of general household disorder, of which irregular dental attendance etc are additional signs. Further investigation in this area may lead to helpful insights on the role of the household in child oral health outcomes.

The food security measures had a marked impact on child use of dental services and receipt of dental care, with most items having an association with at least one dental characteristic (Table 5). The food security items 'food running out due to lack of money' and 'feeling stressed because of not having enough money for food'

Table 5: Use of dental services and receipt of dental care by food security characteristics

	Total N (column %)	Irregular dental atten- dance N (row %)	Receipt of restor- ation N (row %)	Receipt of extra- ction N (row %)
<i>We can afford to eat properly</i>				
Always	1931 (65.8)	110 (5.8) ^a	1223 (61.9)	325 (14.7)
Sometimes or never	1004 (34.2)	114 (10.4)	641 (66.4)	182 (16.4)
<i>Food runs out due to lack of money</i>				
Often or sometimes	1041 (35.4)	115 (9.3) ^c	650 (67.0) ^c	202 (20.1) ^a
Never	1899 (64.6)	109 (6.1)	1218 (61.7)	306 (13.7)
<i>Eat less because of lack of money</i>				
Often or sometimes	879 (30.0)	95 (8.7)	548 (67.6) ^c	175 (21.3) ^a
Never	2051 (70.0)	127 (6.3)	1313 (61.9)	331 (13.7)
<i>The variety of food we eat is limited by lack of money</i>				
Often or sometimes	1318 (44.9)	129 (8.1)	849 (65.7)	254 (17.6) ^c
Never	1618 (55.1)	93 (6.0)	1018 (61.5)	253 (13.9)
<i>We rely on others to provide food/money for food when our household runs out</i>				
Often or sometimes	585 (19.9)	56 (8.3)	367 (67.1)	102 (18.3)
Never	2353 (80.1)	167 (6.5)	1500 (62.4)	405 (14.7)
<i>We use food grants or food banks when we don't have enough money for food</i>				
Often or sometimes	445 (15.2)	54 (11.8) ^a	278 (65.7)	91 (17.5)
Never	2492 (84.8)	168 (6.2)	1589 (62.6)	417 (14.9)
<i>We feel stressed because of not having enough money for food</i>				
Often or sometimes	1028 (35.1)	107 (9.1) ^c	645 (66.9) ^c	201 (19.6) ^a
Never	1904 (64.9)	117 (6.1)	1218 (61.6)	303 (13.6)
<i>It is stressful because we can't provide the food we want for social occasions</i>				
Often or sometimes	844 (28.9)	89 (9.2) ^c	516 (64.1)	163 (21.2) ^a
Never	2080 (71.1)	132 (6.1)	1341 (62.6)	341 (13.6)

^aChi-Square P<0.001^bChi-Square P<0.01^cChi-Square P<0.05**Table 6: Use of dental services and receipt of dental care by other dental care characteristics**

	Total N (column %)	Irregular dental atten- dance N (row %)	Receipt of restor- ation N (row %)	Receipt of extra- ction N (row %)
<i>Received Dental Care Before</i>				
Yes	2995 (91.5)		1969 (65.3) ^a	529 (15.4) ^b
No	280 (8.5)		149 (49.3)	36 (7.7)
<i>How Many Times Brush Teeth Yesterday</i>				
None	481 (14.9)	47 (9.3)	334 (68.5)	95 (17.7)
Once or more	2758 (85.1)	226 (6.7)	1764 (63.6)	464 (14.4)
<i>Receipt of Restoration</i>				
Yes	2118 (64.7)	149 (5.5) ^a		477 (19.9) ^a
No	1157 (35.3)	131 (10.2)		88 (5.8)
<i>Receipt of Extraction</i>				
Yes	565 (17.3)	36 (3.7) ^b	477 (85.9) ^a	
No	2710 (82.7)	244 (7.8)	1641 (60.3)	
<i>Dental Pain Kept Awake at Night</i>				
Yes	568 (18.0)	32 (3.6) ^b	486 (81.2) ^a	234 (39.0) ^a
No	2687 (82.0)	248 (7.9)	1632 (60.7)	331 (10.0)
<i>Receipt of a Dental General Anaesthetic</i>				
Yes	170 (5.2)	9 (3.8)	134 (81.5) ^c	124 (68.4) ^a
No	3105 (94.8)	271 (7.4)	1984 (63.2)	441 (11.9)

^aChi-Square P<0.001^bChi-Square P<0.01^cChi-Square P<0.05

had negative associations with all three dental characteristics. This suggests that stress at a household level may impact on child oral health behaviour and oral health-related quality of life. A career who is stressed about household food issues may not have the mental or emotional capacity to make their child's oral health a priority. Household

stress may also exacerbate dental pain, with Vargas et al. suggesting that childhood stress and psychological well-being may influence child experience of dental pain more than previously acknowledged (Vargas et al., 2005). This too is an area that warrants further investigation.

The dental associations were unsurprising,

given the established relationship between regular use of dental services and receipt of conservative, as opposed to palliative, care (Kallestal, 2005). Experience of dental pain at night was associated with all three dependent variables (Table 6). Douglass and Douglass suggested that experience of dental pain at night is an indication of severe oral health needs which often translates to receipt of restorations or extractions, which was supported by our findings (Douglass and Douglass, 2003).

In summary, New Zealand child use of dental services and receipt of dental care was seen to have associations with many behavioural and material factors at a bivariate level. There is a need for further investigations that explore factors influencing these findings, particularly those pertaining to less understood paradigms such as household organisation and food security. The findings may enable policy makers to plan and implement oral health strategies that more specifically target New Zealand children's needs, backgrounds and culture, and encourage oral health-promoting and culturally acceptable food choices and lifestyles.

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KEYWORDS Māori; Pacific; children; oral health; behaviours

ABSTRACT This study was conducted to examine use of dental services and receipt of dental care by a range of material and behavioural factors among Māori, Pacific and New Zealand European or Other (NZE) children in New Zealand. Data were obtained from the 2002 National Children's Nutrition Survey. Bivariate associations were calculated between 3 use of dental services and receipt of dental care measures, and 51 personal characteristics in 6 domains. Analyses took into account the complex sampling design but not potential confounding. Some 3275 children participated; 37.4 % Māori, 32.3 % Pacific and 30.3% NZEO. Irregular dental attendance was associated with children who were 11–14 years, Pacific, had not always lived in New Zealand, lived in rented accommodation, frequently watched television, consumed breakfast on the way to school, purchased lunch, consumed sugar-containing products or had food security issues. A higher proportion of children who were aged 11–14 years, Māori, had low household income, lived with 4+ children, regularly watched television, consumed breakfast on the way to school, frequently consumed high-sugar foods, had food security issues, experienced dental pain at night or had received dental care under a general anaesthetic had received a restoration. Extraction receipt was associated with children who were Pacific, had low household income, had a disability, purchased their lunch, regularly consumed high-sugar-containing products, had food security issues, had received a restoration, experienced dental pain at night or received dental care under a general anaesthetic. In conclusion socio-demographic, household, physical/lifestyle, dietary, food security and oral health factors all play a role in New Zealand child use of dental services and receipt of dental care.

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