

ASSOCIATIONS BETWEEN ETHNICITY AND CHILD HEALTH FACTORS IN NEW ZEALAND

Objectives: To identify associations between material and behavioral factors in relation to health among Māori, Pacific, and New Zealand European or other (NZEO) children in New Zealand.

Design: Cross-sectional using a two-stage random clustered sampling procedure.

Participants: 3,275 children: 37.4% Māori, 32.3% Pacific, and 30.3% NZEO.

Main Outcome Measures: Prevalence of demographic, socioeconomic, food security, physical/lifestyle, dietary, and dental factors by ethnic group.

Results: Proportionally more Māori and Pacific children, respectively, lived in large households, and approximately one quarter of each group had an annual household income <\$20,000. Approximately one fifth of Māori and Pacific households respectively relied on food banks when they did not have enough money for food, and more Pacific household occupants felt stressed when food could not be provided for social occasions. A higher proportion of Pacific children were obese. Approximately 40% of Māori and NZEO children did not play physically active games, and almost four fifths of Māori children had watched television every night the previous week. A higher proportion of Pacific children ate breakfast on the way to school or purchased their school lunch. More than half the Māori and Pacific children had consumed a chocolate bar or soda ≥ 4 times the previous month, and a higher proportion of Pacific children added sugar to hot beverages. Proportionally more Māori children had received a restoration or experienced dental pain at night, and a higher proportion of Pacific children had received an extraction due to dental caries.

Conclusions: Marked differences were found in material and behavioral outcomes in relation to child health when ethnicity was considered. (*Ethn Dis.* 2007;17:84–91)

Key Words: Behavioral, Children, Health, Māori, Material, New Zealand, Pacific

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INTRODUCTION

Despite marked improvements in health in the overall child population of many developed countries in recent times, a small proportion of children in such countries carry a disproportionate share of the health burden.¹ Some evidence points to the role of demographic,² socioeconomic,³ physical/lifestyle,⁴ environmental⁵ and dietary^{6,7} factors in these disparities. The impact of food security on child health outcomes is a less explored concept but one that may be a useful proxy measure of socioeconomic status (SES) when investigating groups for whom more traditional SES instruments are culturally inappropriate. Food security is defined as “the ready availability of nutritionally adequate foods and the ability of people to acquire personally acceptable foods in a socially acceptable way.”⁸

One conceptual approach to examining such determinants involves classifying variables as material or behavioral.⁹ Material factors (material life circumstances or assets) are often assessed at a community level. They are structural in nature, relatively resistant to change, and tend to require political intervention.¹⁰ By contrast, behavioral items (observable actions) are usually addressed at an individual level, have been extensively researched, and tend to follow a medical intervention model.

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We must explore the pathways through which these factors influence child health in order to design and implement appropriate interventions.

The main ethnic groups in the New Zealand child population include New Zealand European or others (NZEO), who represent 66.2% of the ≤ 14 -year-old population; Māori (the indigenous group, 23.2%); and Pacific (Cook Island, Western Samoan, Niuen, Tongan, Tuvaluan, Tokelaun, or Fijian, 10.6%).¹¹ Māori and Pacific children do not enjoy the same social advantage as their NZEO counterparts; >60% of Māori and Pacific children live in government-subsidized housing, and one third of Māori and Pacific adults receive a government benefit.¹¹ Māori and Pacific children also do not fare well in terms of general health. They have higher rates of hospitalization (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. The SDS 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 the 20th century.¹² Some 97% of the 4- to 13-year-old population are currently enrolled in the SDS.¹³ Dental therapists employed by the SDS perform a range of services, without fee, in school-based dental clinics, including restorations to primary and permanent teeth, pulp treatments, and extractions to primary teeth.¹³ Disparities in SDS enrollment and service provision exist; children

from socially disadvantaged or minority groups are less likely to benefit from the service.¹⁴

Until the 1990s, health surveys in New Zealand showed little to no ethnic differentiation.¹⁵ We cannot ignore the increasing numbers of children of ethnic minority groups in New Zealand, however, and the influence of culture on the health of such children. The National Child Nutrition Survey (NCNS) was a cross-sectional study of Māori, Pacific, and NZEO children that aimed to explore the effect of material and behavioral factors on health outcomes. The purpose of this paper is to identify bivariate associations between ethnicity and material/behavioral factors in relation to the health of those involved in the NCNS. For the purposes of our study, material factors were considered to be sociodemographic items (including food security), while behavioral factors were those pertaining to physical/lifestyle, dietary, or dental items.¹⁰ We aimed to test two hypotheses: 1) Māori and Pacific children would have a higher prevalence of material factors known to be damaging to health than NZEO children; and 2) Māori and Pacific children would have a higher prevalence of behavioral factors known to be damaging to health than NZEO children.

The purpose of this paper is to identify bivariate associations between ethnicity and material/behavioral factors in relation to the health of those involved in the National Child Nutrition Survey.

Table 1. Māori/Pacific/NZEO children by demographic characteristics, unweighted counts, (weighted column percentages)

	Māori	Pacific	NZEO	P value*
Total	1224 (100.0)	1058 (100.0)	993 (100.0)	
Age group				
5–6 years	280 (20.9)	226 (20.7)	186 (18.7)	
7–10 years	575 (40.8)	420 (41.6)	430 (40.6)	
11–14 years	369 (38.3)	412 (37.6)	377 (40.7)	
Sex				
Male	631 (51.3)	514 (51.5)	552 (51.4)	
Female	593 (48.7)	544 (48.5)	441 (48.6)	
School				<.001
Urban	955 (77.3)	1046 (98.8)	791 (80.0)	
Rural	269 (22.7)	12 (1.2)	202 (20.0)	
Live in New Zealand				<.001
Always	1186 (96.9)	798 (75.4)	827 (83.5)	
Not always	38 (3.1)	260 (24.6)	166 (16.5)	

* Pearson chi-square test.

NZEO= New Zealand European or other.

METHODS

Ethical approval for the NCNS was received from all 13 regional health ethics committees in New Zealand. A two-stage sampling strategy was used. First, schools were randomly selected from the Ministry of Education list of schools and invited to participate. Schools with <50 students (except Te Kura Kaupapa Māori schools), correspondence schools, and schools on the Chatham Islands were excluded. Because 16 schools from the original sample of 160 declined, an additional sample of 30 schools was recruited (from which two schools declined). The overall response ratio from schools was 91% ($N=172$). The second stage involved randomly sampling children from these schools in proportion to the total number of enrolled students. Different sampling frames were used for Māori, Pacific, and NZEO children to ensure approximately equal numbers from each ethnic group in the final survey sample. Children were selected according to the following proportions: Māori .161, Pacific .410, NZEO .050, and the sampling proportions included an inflation factor to account for a 70% response rate. A sample of 1000 chil-

dren from each ethnic group was recruited under the study design, allowing for design effects of 1.7 from weighting caused by differential ethnic sampling proportions and 1.5 for school-based clustering. This is approximately equivalent to 400 recruited by simple random sampling, meaning the predicted standard error around a proportion of 50% was 2.5%.

The survey employed a number of instruments to obtain data: 1) a computer-based home interview that contained items pertaining to sociodemographic information, food intake, food habits, physical activity, food security, and dental health; 2) a 24-hour dietary recall; 3) physical measures such as weight, height, mid-upper arm, and waist circumference; 4) subscapular and triceps skinfold thicknesses; and 5) blood and urine samples to assess iron, zinc, lipid, and iodine levels. The dental items were based on those used in previous studies,^{16,17} and focus group methods were used to test the appropriateness of the items with Māori and Pacific children.¹⁸ The dental items were also clinically validated.¹⁹

Consent forms and a cover letter explaining the study were sent home with each eligible child. The forms

stressed that child and carer involvement was voluntary, and that participants could withdraw from the study at any stage with no consequent effect on their health care. Carers were requested to convey the information for children aged 5–9 years, while children aged 10–14 years completed the questionnaires themselves. Carers completed all items pertaining to household income and food security.

To account for the complex sample approach, each participant was allocated a survey weight.²⁰ The purpose of weighting was to produce estimates that would have been obtained had the entire eligible child population been surveyed. Statistical analyses were carried out by using the complex sampling module in SPSS 13.0, a software package that takes into account the clustered sampling design to yield unbiased standard error estimates and design effects.²¹ Levels of statistical significance were set at $P < .05$, and the Pearson chi-square test was used to compare differences between categorical variables. No adjustment was made for multiple comparisons. Type II errors increase in an attempt to reduce type I errors when applying such corrections, meaning significant results are lost and the power of the study is reduced.^{22–25}

RESULTS

A participant was defined as any child who had completed a 24-hour diet recall. The total number of children recruited from the 172 schools was 4728, and 3275 participated for a response ratio of 69.3%. Of the 3275 participants, 1224 were Māori, 1058 were Pacific, and 993 were NZEO. No significant differences by age and sex were seen (Table 1).

Material Factors

A higher proportion of Pacific children lived in a flat or hostel, with others (such as relatives), with ≥ 3

Table 2. Māori/Pacific/NZEO children by household SES characteristics, unweighted counts, (weighted column percentages)

	Māori	Pacific	NZEO	P value*
Total	1224 (100.0)	1058 (100.0)	993 (100.0)	
Residential				.016
Live in townhouse	1171 (95.8)	974 (92.0)	948 (95.5)	
Live in other (flat, hostel)	53 (4.2)	84 (8.0)	45 (4.5)	
Rental				<.001
Rent private	416 (33.4)	232 (21.6)	188 (18.9)	
Own	602 (50.4)	371 (34.7)	763 (77.1)	
Other (relatives)	206 (16.1)	455 (43.7)	42 (4.0)	
Bedrooms				
1–2	128 (10.0)	89 (8.1)	102 (10.4)	
3–4	973 (79.8)	826 (78.2)	795 (80.0)	
≥ 4	123 (10.2)	143 (13.7)	96 (9.6)	
Adults				<.001
1	206 (16.8)	94 (9.1)	101 (10.1)	
2	658 (53.6)	492 (46.8)	734 (73.8)	
≥ 3	360 (29.6)	472 (44.1)	158 (16.1)	
Children				<.001
1	240 (19.5)	161 (14.9)	222 (22.4)	
2	436 (35.1)	294 (28.2)	432 (43.3)	
3	291 (24.2)	244 (22.6)	265 (26.8)	
≥ 4	257 (21.1)	359 (34.3)	74 (7.5)	
<5-year-old children				<.001
0	707 (59.0)	456 (43.1)	724 (73.3)	
1	304 (24.3)	330 (31.4)	194 (19.2)	
2	213 (16.6)	272 (25.5)	75 (7.5)	
Food cost per week				<.001
<\$100	195 (17.0)	181 (18.9)	97 (10.7)	
\$100–200	673 (58.8)	539 (57.4)	507 (53.9)	
>\$200	276 (24.2)	228 (23.7)	336 (35.4)	
Income				<.001
<\$20,000	246 (24.6)	229 (27.4)	102 (11.8)	
\$20,000–\$50,000	489 (49.1)	409 (50.6)	312 (35.1)	
>\$50,000	264 (26.3)	179 (22.1)	469 (53.1)	

* Pearson chi-square test.
NZEO=New Zealand European or Other.

adults, ≥ 4 children, or ≥ 2 children aged <5 years (Table 2). Approximately one fifth of Pacific households had a weekly food cost of <US\$100, and approximately one quarter of Māori and Pacific children respectively lived in households with an annual income of <\$20,000.

Proportionally more children from Pacific households could sometimes or never afford to eat properly, ran out of food, ate less because of lack of money, had limited food variety due to financial shortages, or relied on others to provide food money when household supplies

were depleted (Table 3). Approximately one fifth of Māori and Pacific households respectively relied on food banks when there was not enough money for food.

Behavioral Factors

A higher proportion of Māori children had a medical or physical disability, and proportionally more Pacific children were obese (Table 4). Approximately 40% of Māori and NZEO children respectively had not played a game similar to tag, and half the NZEO children had not walked to

Table 3. Māori/Pacific/NZEO children by food security characteristics, unweighted counts; (weighted column percentages)

	Māori	Pacific	NZEO	P value*
Total	1224 (100.0)	1058 (100.0)	993 (100.0)	
We can afford to eat properly				<.001
Always	714 (64.3)	430 (47.7)	787 (86.1)	
Sometimes or never	401 (35.7)	480 (52.3)	123 (13.9)	
Food runs out due to lack of money				<.001
Often or sometimes	424 (37.5)	500 (54.3)	117 (13.1)	
Never	690 (62.5)	416 (45.7)	793 (86.9)	
We eat less because of lack of money				<.001
Often or sometimes	343 (30.9)	444 (48.1)	92 (10.2)	
Never	764 (69.1)	470 (51.9)	817 (89.8)	
The variety of food we eat is limited by lack of money				<.001
Often or sometimes	512 (45.3)	558 (61.0)	248 (27.8)	
Never	602 (54.7)	356 (39.0)	660 (77.2)	
We rely on others to provide food/money for food when our household runs out				<.001
Often or sometimes	264 (23.4)	269 (29.2)	52 (5.8)	
Never	852 (76.6)	645 (70.8)	856 (94.2)	
We use food grants or food banks when we don't have enough money for food				<.001
Often or sometimes	223 (19.9)	181 (19.5)	41 (4.5)	
Never	891 (80.1)	734 (80.5)	867 (95.5)	
We feel stressed because of not having enough money for food				<.001
Often or sometimes	446 (40.1)	433 (47.2)	149 (16.5)	
Never	667 (59.9)	477 (52.8)	760 (83.5)	
It is stressful because we can't provide the food we want for social occasions				<.001
Often or sometimes	319 (28.1)	393 (43.0)	132 (14.9)	
Never	790 (71.9)	519 (57.0)	771 (85.1)	

* Pearson chi-square test.

NZEO= New Zealand European or other.

school, the previous week. The majority of Māori children had watched television every school night the previous week, and 44% of Māori and Pacific children had watched television for 2+ hours on a school day. A higher proportion of NZEO children had played computer games the previous week, and four fifths of Pacific children had played computer games for 4+ hours the previous Saturday. Ten percent of Māori and NZEO children played computer games every school day.

A higher proportion of Pacific children never had breakfast before school, ate breakfast on the way to school, bought their lunch at a dairy (small shop selling convenience food),

or purchased their lunch at school (Table 5). Proportionally more Pacific children ate an apple, and 63.4% of Māori children consumed jam 4 or more times the previous month. More than half the Māori and Pacific children ate a chocolate bar, and 60.9% of Māori children consumed sweets 4 or more times the previous month. Around 57% of Pacific children consumed juice, and proportionally more Māori and Pacific children consumed Coca-Cola® or other soft-drinks, 4 or more times the previous month. A higher proportion of Pacific children added sugar to their milo (a hot chocolate milk drink), tea, or coffee.

Some 94% of NZEO children had previously received dental care, and

almost one fourth of Māori children had not brushed their teeth the previous day (Table 6). Proportionally more Māori children had received a restoration or had experienced dental pain at night, and a higher proportion of Pacific children had received an extraction due to dental caries.

DISCUSSION

This study provides comprehensive population-based estimates of demographic, socioeconomic, physical/lifestyle, dietary, food security, and dental factors in relation to health among Māori, Pacific, and NZEO children in New Zealand. The findings suggest that

Table 4. Māori/Pacific/NZEO children by physical and lifestyle characteristics, unweighted counts (weighted column percentages)

	Māori	Pacific	NZEO	P value*
Total	1224 (100.0)	1058 (100.0)	993 (100.0)	
Medical or physical disability				.003
Yes	392 (32.8)	236 (22.2)	277 (27.8)	
No	832 (68.2)	822 (77.8)	716 (72.2)	
BMI				<.001
Normal	661 (58.7)	369 (38.1)	713 (76.0)	
Overweight	277 (25.0)	338 (33.4)	174 (18.6)	
Obese	180 (16.2)	288 (28.5)	49 (5.4)	
Play tag, bullrush, skipping last week				<.001
No	454 (40.3)	292 (27.0)	402 (41.5)	
Yes	770 (59.7)	766 (73.0)	591 (58.5)	
Walked, rode skateboard to school				<.001
No	536 (44.4)	316 (29.1)	498 (49.8)	
Yes	688 (55.6)	742 (70.9)	495 (50.2)	
On how many school days watched TV				<.001
5	974 (79.2)	730 (69.7)	693 (69.7)	
3-4	133 (11.0)	132 (12.6)	135 (13.6)	
1-2	117 (9.8)	196 (17.7)	165 (16.7)	
How many hours watched TV per school day				<.001
<2	704 (56.0)	704 (55.1)	647 (64.9)	
>2	520 (44.0)	520 (44.9)	346 (35.1)	
Played computer game last week				<.001
Yes	627 (52.4)	461 (44.1)	584 (58.6)	
No	597 (47.6)	597 (55.9)	409 (41.4)	
How many hours played computer last Saturday				<.001
<1	119 (9.4)	73 (7.0)	145 (14.3)	
1-4	143 (12.5)	105 (10.3)	167 (17.0)	
4+	962 (78.2)	880 (82.8)	681 (68.7)	
On how many school days play computer games				<.001
5	134 (11.4)	53 (5.2)	111 (11.4)	
3-4	92 (7.7)	101 (9.9)	121 (12.2)	
1-2	998 (80.9)	904 (84.9)	761 (76.4)	

* Pearson chi-square test.

NZEO= New Zealand European or other.

The findings suggest that Māori and Pacific children are disadvantaged in a range of material and behavioral factors compared with their NZEO counterparts.

Māori and Pacific children are disadvantaged in a range of material and behavioral factors compared with their NZEO counterparts. We aimed to test two hypotheses and these will each be considered in turn.

Hypothesis 1

Māori and Pacific children would have a higher prevalence of material factors known to be damaging to health

than NZEO children (material factors in our study were those pertaining to socioeconomic status [SES] and household food security).

As seen from Tables 2 and 3, Pacific children, more so than Māori children, had material factors that consistently reflected poor health outcomes. For example, they had high numbers of household residents (particularly children aged <5 years), low annual household income, food that sometimes ran

Table 5. Māori/Pacific/NZEO children by dietary characteristics, unweighted counts, (weighted column percentages)

	Māori	Pacific	NZEO	P value*
Total	1224 (100.0)	1058 (100.0)	993 (100.0)	
Breakfast before school				<.001
Usually	886 (70.4)	543 (51.7)	906 (90.8)	
Sometimes	266 (22.8)	384 (36.7)	65 (6.9)	
Never	72 (6.8)	131 (11.5)	22 (2.3)	
Breakfast on way to school				<.001
Yes	321 (26.9)	434 (40.3)	87 (8.6)	
No	903 (73.1)	624 (59.7)	906 (91.4)	
Lunch bought at a dairy				<.001
Yes	499 (41.3)	523 (49.2)	170 (25.4)	
No	725 (58.7)	535 (50.8)	823 (74.6)	
Lunch bought at school				<.001
Yes	787 (65.8)	786 (74.0)	485 (49.5)	
No	437 (34.2)	272 (26.0)	508 (50.5)	
How many times ate apple last month				.003
<3	163 (13.9)	121 (11.6)	170 (17.5)	
>4	1061 (86.1)	937 (88.4)	823 (82.5)	
How many times ate jam last month				<.001
<3	431 (36.4)	448 (42.2)	476 (48.2)	
>4	793 (63.6)	610 (57.8)	517 (51.8)	
How many times ate chocolate bar last month				<.001
<3	606 (47.5)	454 (43.7)	624 (62.3)	
>4	618 (52.5)	604 (56.3)	369 (37.7)	
How many times ate sweets last month				<.001
<3	489 (39.1)	478 (45.2)	524 (52.2)	
>4	735 (60.9)	580 (54.8)	469 (47.8)	
How many times drank juice last month				0.001
<3	681 (55.6)	451 (43.4)	543 (54.3)	
>4	543 (44.4)	607 (56.6)	450 (45.7)	
How many times drank Coca-Cola® last month				<0.001
<3	513 (40.2)	399 (37.6)	611 (61.5)	
>4	711 (59.8)	659 (62.4)	382 (38.5)	
How many times drank other soft-drink last month				<0.001
<3	498 (39.9)	376 (35.5)	586 (58.9)	
>4	726 (60.1)	682 (64.5)	407 (41.1)	
Add sugar to milo (hot chocolate drink)				<0.001
Yes	460 (38.3)	538 (50.7)	261 (26.6)	
No	764 (61.7)	520 (49.3)	732 (73.4)	
Add sugar to tea				<0.001
Yes	423 (36.1)	670 (62.6)	227 (23.6)	
No	801 (63.9)	388 (37.4)	766 (76.4)	
Add sugar to coffee				<0.001
Yes	209 (19.3)	380 (34.8)	99 (10.5)	
No	1015 (80.7)	678 (65.2)	894 (89.5)	

* Pearson chi-square test.

NZEO= New Zealand European or other.

out due to lack of money, and household occupants who felt stressed when they were unable to provide food for social occasions. A number of reasons may explain these findings. Cultural

obligations mean money is often given to other Pacific family members (eg, sent to family in the islands), houses may be filled with long-term guests, church/cultural ceremonies may require

substantial financial support, and household costs may be high because of the many occupants and large number of social occasions. Household food insecurity, such as that reported in our

Table 6. Māori/Pacific/NZEO children by dental characteristics, unweighted counts, (weighted column percentages)

	Māori	Pacific	NZEO	P value*
Total	1224 (100.0)	1058 (100.0)	993 (100.0)	
Visited a dentist before				<.001
Yes	1132 (91.0)	926 (87.9)	937 (94.0)	
No	92 (9.0)	132 (12.1)	56 (6.0)	
Brushed yesterday				<.001
None	303 (24.7)	103 (10.4)	75 (7.4)	
Once	466 (38.4)	472 (45.8)	352 (35.7)	
Twice or more	442 (37.0)	469 (43.8)	557 (56.9)	
Received a restoration				<.001
Yes	886 (73.8)	625 (59.2)	607 (61.3)	
No	338 (26.2)	433 (40.8)	386 (38.7)	
Experienced dental pain at night				.006
Yes	256 (20.2)	175 (16.8)	157 (15.5)	
No	968 (79.8)	883 (83.2)	836 (84.5)	
Received an extraction				.001
Yes	212 (16.7)	215 (20.5)	138 (13.5)	
No	1012 (83.3)	843 (79.5)	855 (86.5)	
Dental general anesthetic				
Yes	71 (5.8)	48 (4.8)	51 (5.1)	
No	1153 (94.2)	1010 (95.2)	942 (94.9)	

* Pearson chi-square test.

NZEO= New Zealand European or other.

study, has a number of implications for child health. Examples include inadequate intake of several important nutrients, cognitive developmental defects, and behavioral and psychosocial dysfunction.²⁶ Inability to purchase enough nutritious food, when combined with the resultant emotional or psychological stress, may contribute to adverse health effects or exacerbate poor child health caused by other factors.

Hypothesis 2

Māori and Pacific children would have a higher prevalence of behavioral factors known to be damaging to health than NZEO children (behavioral factors included physical/lifestyle, dietary, and dental health items).

A higher proportion of Pacific children in our study were obese, which supports the literature indicating that Pacific children have the highest prevalence of obesity and dietary-related diseases in New Zealand, followed by their Māori counterparts.²⁷ Higher proportions of both Māori and Pacific children in our study led a more

sedentary lifestyle compared with their NZEO counterparts. They watched more hours of television per week and played a greater number of computer games. Increasingly sedentary lifestyles are known to have a marked influence on the obesity epidemic and diabetes prevalence among this group.^{28,29} A higher proportion of Pacific children did not eat breakfast before school. Such behavior is an indicator of binge eating, with low glycemic index levels in the morning that lead to cravings by mid-morning, along with lack of attention and concentration in the classroom.³⁰ Over half the Māori and Pacific children respectively consumed a chocolate bar or soda ≥ 4 times the previous month, and a higher proportion of Pacific children added sugar to hot beverages. Consumption of items with high sugar content is a risk factor for obesity and diabetes, especially if related to lack of exercise.

The disparities in receipt of dental care are perplexing given New Zealand's model of providing universal access to dental care for children. The SDS

operates free of charge and offers service without discrimination to all New Zealand children who are eligible. Yet 12% and 9% of Pacific and Māori children, respectively indicated that they had never received such care (Table 6). This finding may have been due, in part, to a lack of cultural awareness of the New Zealand oral health workforce. Oral health professionals with limited knowledge of Māori and Pacific cultural constructs concerning the head may unwittingly cause offence when providing care, leading to consequent avoidance of dental services and late presentation of oral health problems among Māori and Pacific children.³¹ There are also few Māori and Pacific dental health professionals in New Zealand,³² despite evidence that ethnic groups respond best to health professionals who share the same culture and belief systems.^{33,34}

In summary, our study has shown that a higher proportion of both Māori and Pacific children in New Zealand had material factors and engaged in behaviors not conducive to health. Since

we already know that disparities exist, the next step is to examine if such differences are due to acculturation or poverty or because appropriate services do not reach Māori and Pacific child groups. Understanding the beneficial effects of culture on health may help identify positive policy options to reduce child health inequalities in New Zealand.

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