



New Zealand Child and Youth
Epidemiology Service

Health and wellbeing of under-five year olds in the South Island 2017

Child weight

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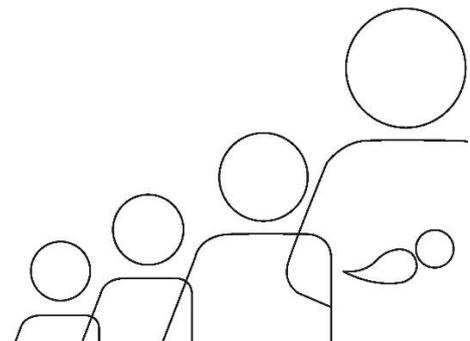
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This report has been prepared for the South Island Alliance: Nelson Marlborough, Canterbury, South Canterbury, West Coast and Southern District Health Boards.

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VII. CHILD WEIGHT

This indicator is important to provide a picture of the patterns of weight of four year olds within the population served by each DHB. At an individual child level, inclusion of weight within the before school check (B4SC) allows identification of four year olds who are thin, overweight or obese.

The B4 School Check¹ is the final core contact of the Well Child/Tamariki Ora programme and is intended to be available to all children within the eligible age bracket. B4 School Checks are to be initiated and completed with children after their fourth birthday (48 months old) and before their fifth birthday (60 months old), but children who miss out in this time period may receive a B4 School Check prior to reaching six years of age. The B4 School Check may comprise: assessing child and family health (such as immunisation status, and family violence and smoking); hearing, vision, and oral health screening; development and behavioural screening; growth and weight monitoring; and support, referral, and intervention services where appropriate.

Obesity is a condition of excess body fat in relation to lean body mass to the extent that it may have a negative effect on health.² Obesity rates have increased in all ages, genders and ethnic groups over the last 30 years, with those born more recently becoming obese at a younger age.³ Obesity is particularly concerning in children as it is associated with a wide range of health conditions and increased risk of premature onset of chronic illnesses such as diabetes and hypertension. It can also affect a child's immediate health, educational attainment and quality of life.³

Body mass index (BMI) is the measure commonly used to classify body weight, with sex- and age-specific BMI cut-off points used to define thinness, overweight and obesity in children.⁴ There is, however, currently a lack of scientific evidence on the relationship between specific BMI thresholds and any potential short- and long-term health risks for the child.²

The "Raising healthy kids" health target is one of the initiatives in the childhood obesity plan.^{3,5} This target requires that, by December 2017, 95% of obese children identified in the B4 School Check programme will be offered a referral to a health professional for clinical assessment and family-based nutrition, activity and lifestyle interventions. This will mean that any medical complications in four year olds who are identified as obese are managed appropriately and that the children and their families are offered any services they may find helpful to support healthy eating and activity.³ The package brings together initiatives across government agencies, the private sector, communities, schools, families and whānau.³

The following section presents data about the weight of four year olds at the time of their B4 school check (B4SC). The section concludes with links to guidelines and brief overviews of evidence for good practice, including obesity-related review chapters published in NZCYES 2013 reports.

Data sources and methods

Indicator

Children with a B4 School Check (B4SC) BMI-for-age value in the obese range

Data sources and definitions

Numerator: Number of children in the overweight or obese range as at the B4 School Check (B4SC)

Denominator: Total number of children with anthropomorphic information recorded at B4 School Check (B4SC)

Data source: B4 School Check Information System (B4SC IS)

BMI-for-age can be classified into:^{4,6}

Underweight: below the 2nd centile

Healthy weight: between 5th and 84th percentile (inclusive)

Overweight: above 91st centile

Obese: above 98th centile.

Additional information

The BMI-for-age percentiles were calculated based on the anthropomorphic information measured at the B4 School Check.⁷

Only children with caregiver consent for B4 School Check were included in the analyses.

Health target, implemented 1 July 2016: "By December 2017, 95% of obese children identified in the Before School Check (B4SC) programme will be offered a referral to a health professional for clinical assessment and family based nutrition, activity and lifestyle interventions." Each district health board (DHB) agrees to a target number of checks which it expects to deliver in a year. Refer to <http://www.health.govt.nz/new-zealand-health-system/health-targets/about-health-targets/health-targets-raising-healthy-kids>

National coverage of B4 School Check

Table VII-1 presents the number of children four years of age who were offered a B4 School Check from 2013 to 2016. The number of four year olds offered a B4 School Check has been around 54,000–59,000 each year. This table also presents the way that the percentage of four-year-olds offered a B4 School Check varies with the use of different, valid, denominator populations from year to year. When comparing statistics it is important, therefore, to determine what population is being used to calculate coverage.

Table VII-1 Children offered a B4 School Check, New Zealand 2016

Year	4-year-olds offered a B4 School Check (n)	Percent of population				
		Eligible 4-year-olds*	Enrolled with Primary Health Organisation (PHO)†‡	Live birth cohort§	Estimated resident population	Projected population#
4-year-olds offered a B4 School Check ¹						
New Zealand						
2013	53,960	83.13	82.76	85.27	85.00	
2014	59,100	90.46	91.95	91.35	91.51	
2015	57,785	90.67	89.22	92.94	87.98	91.76
2016	57,258	91.20	94.66	92.30	85.74	90.98

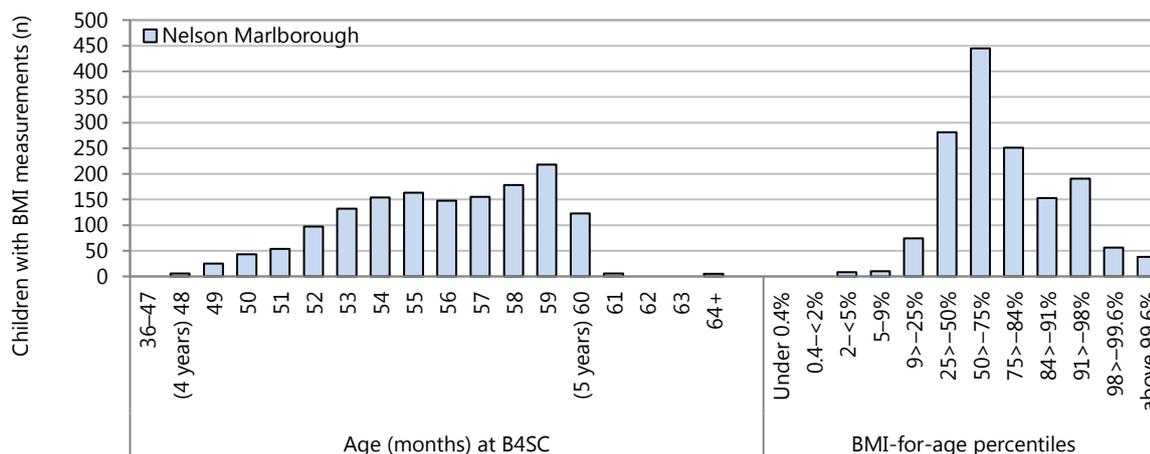
Source: Numerator: B4SC IS Denominators: *B4SC performance reports, †PHO Enrolment Collection, ‡Access to Primary Care, §BDM live births; ||StatsNZ ERP, Age: 4 years (48–59 months), †Offered = any child documented in B4SC IS (includes declined checks)

Children with anthropomorphic measurements

Figure VII-1 to Figure VII-5 present the age of the child for whom a B4 School Check had been completed. The median age was between 51 and 56 months (Nelson Marlborough: 56, South Canterbury: 51, Canterbury: 53, West Coast: 51, and Southern: 53).

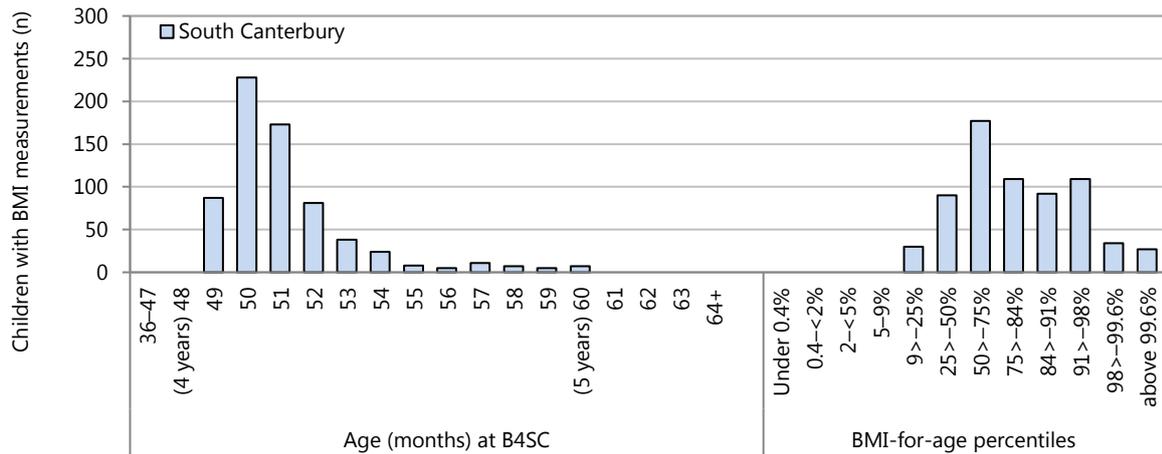
Figure VII-1 to Figure VII-5 also present the BMI-for-age percentile groupings for children aged between 48–71 months that completed the B4 School Check. In all five South Island DHBs, the highest number of children had a BMI-for-age within the 50th–75th percentile. There were also relatively high numbers of overweight (91st–98th centile) children in South Canterbury and Southern DHBs.

Figure VII-1 Age (in months) of child and BMI-for-age percentiles at the B4 School Check, Nelson Marlborough DHB 2016



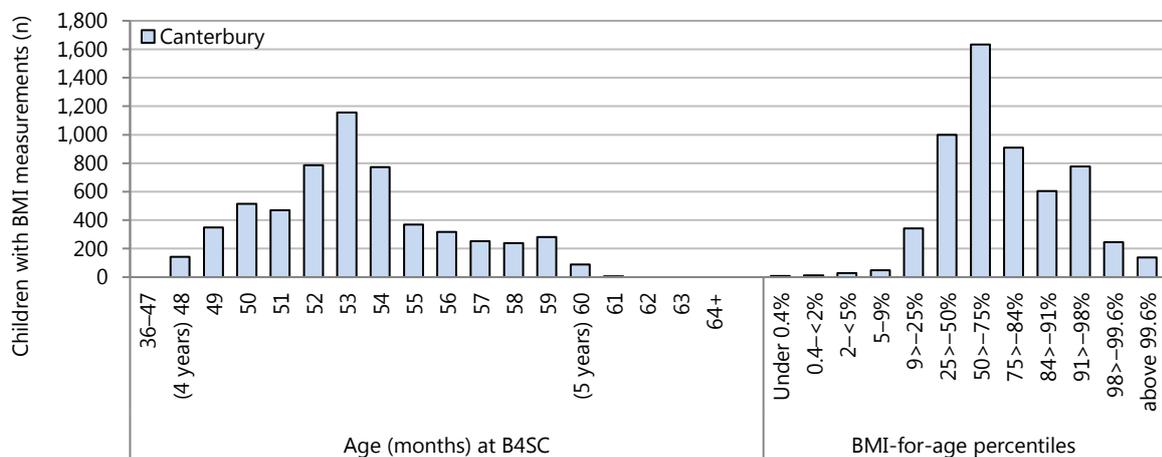
Source: B4SC IS; Consented B4 School checks completed in: 2016, Age is in months

Figure VII-2 Age (in months) of child and BMI-for-age percentiles at the B4 School Check, South Canterbury DHB 2016



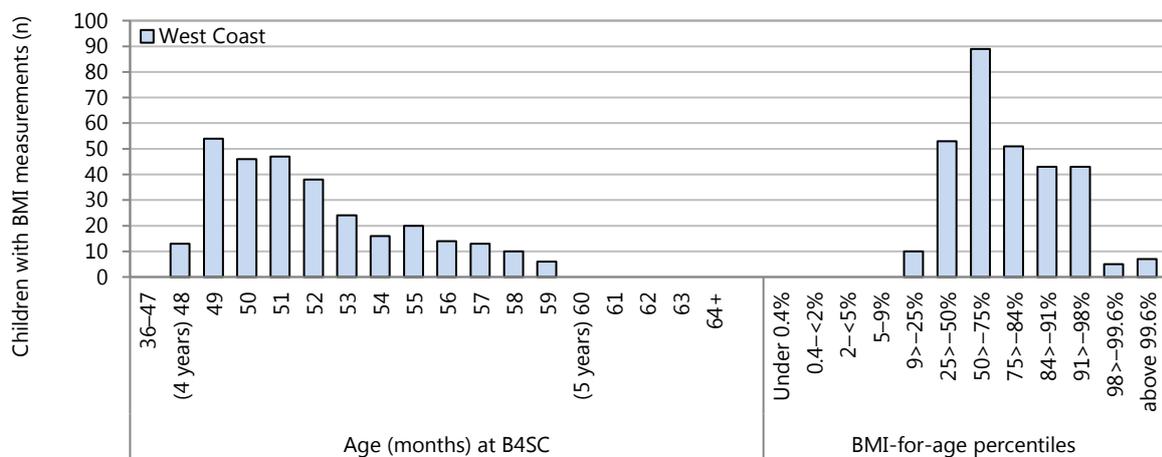
Source: B4SC IS;
Consented B4 School checks completed in: 2016, Age is in months

Figure VII-3 Age (in months) of child and BMI-for-age percentiles at the B4 School Check, Canterbury DHB 2016



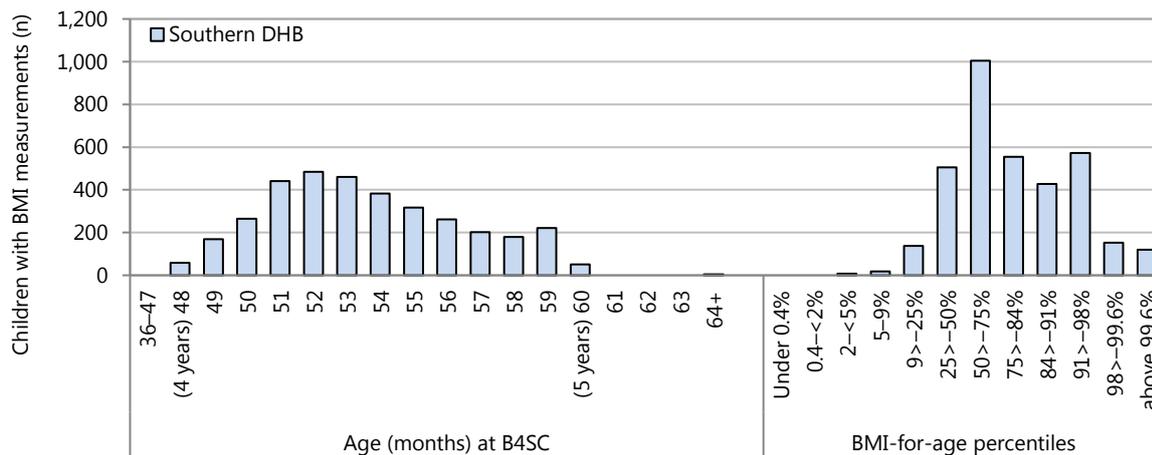
Source: B4SC IS;
Consented B4 School checks completed in: 2016, Age is in months

Figure VII-4 Age (in months) of child and BMI-for-age percentiles at the B4 School Check, West Coast DHB 2016



Source: B4SC IS;
Consented B4 School checks completed in: 2016, Age is in months

Figure VII-5 Age (in months) of child and BMI-for-age percentiles at the B4 School Check, Southern DHB 2016



Source: B4SC IS;
Consented B4 School checks completed in: 2016, Age is in months

The following analyses are limited to children aged four or five for whom a B4 School Check has been completed, including the documentation of anthropomorphic measurements.

The children with completed B4 School Checks and documented anthropomorphic measurements are presented in Table VII-2 according to the percentile groupings. The majority of children in all five South Island DHBs had B4SC BMI measurements within the normal/healthy weight percentiles. The proportion of children who were overweight ranged from 12.7% in Nelson Marlborough to 16.3% in Southern DHB. The proportion of children considered obese ranged from 4.0% on the West Coast to 9.0% in South Canterbury. The ‘other’ category consists of children with BMI-for-age percentile outside the existing ranges (i.e. percentiles 2- < 5; 84- > 91).

Table VII–2 B4 School Check BMI-for-age centile groupings, South Island DHBs 2016

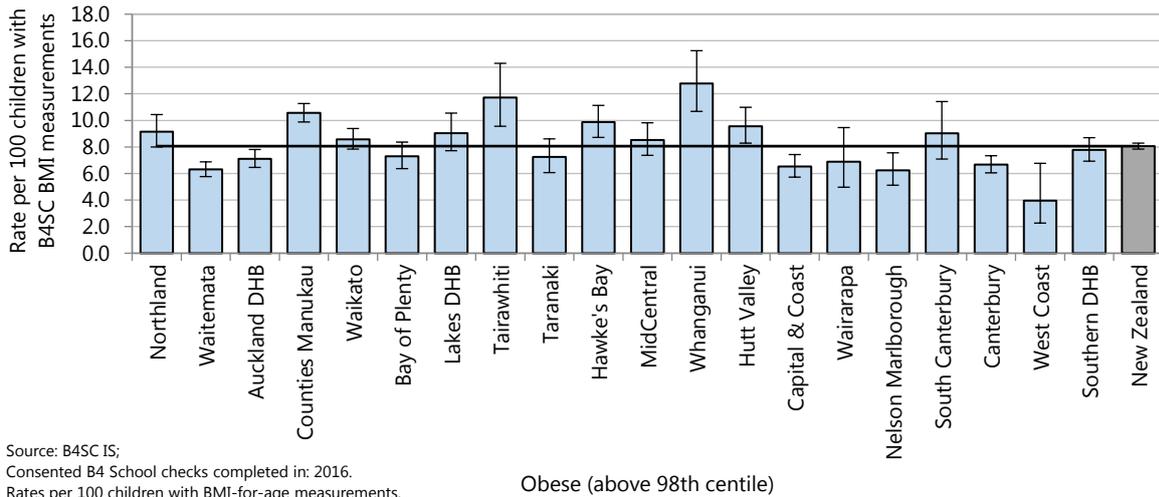
BMI-for-age centile groups	2016 (n)	Rate
Children who had BMI-for-age measured at a B4 School Check in 2016		
Nelson Marlborough		
Possible undernutrition/underweight (<2%)	<5	s
Normal/healthy weight (5–<85%)	1,061	70.31
Overweight (91>–98%)	191	12.66
Obese (>98%)	94	6.23
Other	161	10.67
Total	1,509	100.00
South Canterbury		
Possible undernutrition/underweight (<2%)	<5	s
Normal/healthy weight (5–<85%)	408	60.36
Overweight (91>–98%)	109	16.12
Obese (>98%)	61	9.02
Other	94	13.91
Total	676	100.00
Canterbury		
Possible undernutrition/underweight (<2%)	21	0.37
Normal/healthy weight (5–<85%)	3,932	68.42
Overweight (91>–98%)	777	13.52
Obese (>98%)	383	6.66
Other	634	11.03
Total	5,747	100.00
West Coast		
Possible undernutrition/underweight (<2%)	0	..
Normal/healthy weight (5–<85%)	203	66.78
Overweight (91>–98%)	43	14.14
Obese (>98%)	12	3.95
Other	46	15.13
Total	304	100.00
Southern DHB		
Possible undernutrition/underweight (<2%)	<5	s
Normal/healthy weight (5–<85%)	2,220	63.41
Overweight (91>–98%)	572	16.34
Obese (>98%)	272	7.77
Other	434	12.40
Total	3,501	100.00
New Zealand		
Possible undernutrition/underweight (<2%)	292	0.52
Normal/healthy weight (5–<85%)	37,321	65.91
Overweight (91>–98%)	8,119	14.34
Obese (>98%)	4,566	8.06
Other	6,327	11.17
Total	56,625	100.00

Source: B4SC IS; Consented B4 School Checks completed in: 2016. Rate per 100 children with BMI-for-age measurements

Children within the obese range

Figure VII–6 and Table VII–3 present the proportion of children aged four or five years who completed a B4 School Check and had anthropomorphic measurements within the obesity range (above 98th percentile) during 2016. The rates of obesity among children completing the B4 School Check were significantly lower than the national rate in Nelson Marlborough, Canterbury and West Coast DHBs, and not significantly different in South Canterbury and Southern DHBs.

Figure VII-6 Children with BMI values in the obese range at B4 School Check, by district health board, 2016



Source: B4SC IS;
Consented B4 School checks completed in: 2016.
Rates per 100 children with BMI-for-age measurements.
Grouped BMI-for-age percentiles

Obese (above 98th centile)

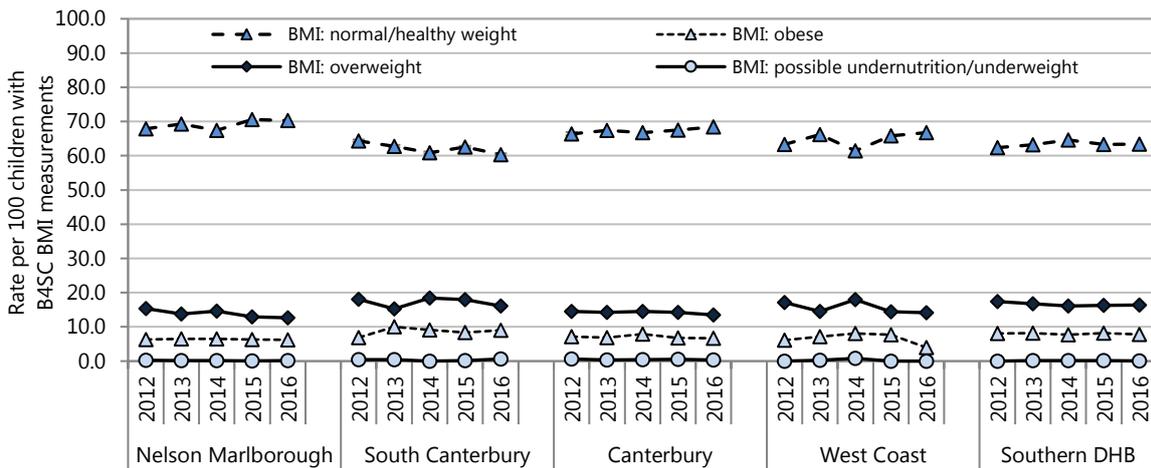
Table VII-3 Children with BMI values in the obese range at B4 School Check, South Island DHBs 2016

DHB	2016 (n)	Rate	Rate ratio	95% CI
Children who had BMI-for-age measured at a B4 School Check in 2016				
Obese (above 98th centile)				
Nelson Marlborough	94	6.23	0.77	0.63–0.94
South Canterbury	61	9.02	1.12	0.88–1.42
Canterbury	383	6.66	0.83	0.75–0.91
West Coast	12	3.95	0.49	0.28–0.85
Southern	272	7.77	0.96	0.86–1.08
New Zealand	4,566	8.06	1.00	

Source: B4SC IS; Rate per 100 children with BMI-for-age measurements. Rate ratios are unadjusted

Figure VII-7 presents the trends in BMI-for-age weight groupings for children aged four or five who completed a B4 School Check for the South Island DHBs. The proportion of children within the normal/healthy weight range has been relatively stable in the Southern DHB, increased slightly in Nelson Marlborough, Canterbury and West Coast DHBs, and decreased slightly in South Canterbury DHB from 2012–2016.

Figure VII-7 Trends in B4SC BMI, by BMI-for-age grouping, South Island DHBs 2012–2016



Source: B4SC IS;
Grouped BMI-for-age percentiles.
Consented B4 School checks completed in: 2016

The small number of 4 or 5 year old children with B4 School Checks completed BMI measurements within the obese percentiles (above 98th percentile) on the West Coast do not allow for meaningful comparisons by demographic factor and are therefore not presented.

Figure VII–8 and Figure VII–11 present the proportion of 4 or 5 year old children with B4 School Checks completed BMI measurements within the obese percentiles within each district health board by the residential deprivation score (NZDep2013 index of deprivation score), ethnicity, and gender. The unadjusted rate ratio presents the gap, if any, between the groups and the reference group. The following associations were observed, bearing in mind that this univariate analysis does not quantify the independent effect of each demographic factor:

- The obesity rate was higher for those residing in areas with the highest (quintile 5, deciles 9–10) NZDep2013 scores compared with quintile 1 in all South Island DHBs
- Rates of obesity were higher for Pacific and Māori children, compared with European/Other, in all South Island DHBs
- Boys had significantly higher rates of obesity, compared with girls, in all South Island DHBs, although with the exception of Counties Manukau these differences were only marginally significant.

Figure VII–8 Children with B4SC obese BMI-for-age measurements, by demographic factor, Nelson Marlborough DHB 2016

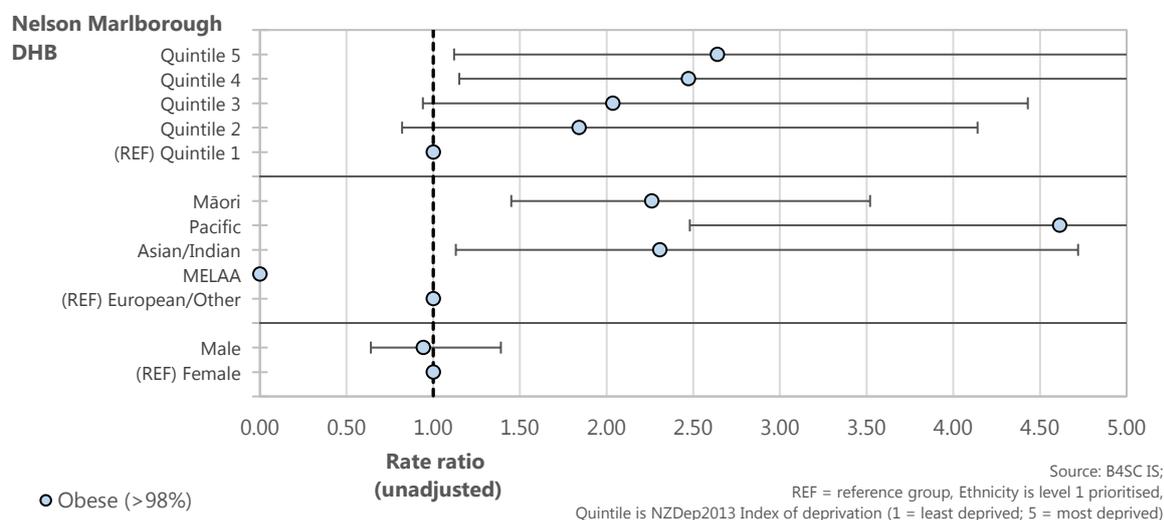


Figure VII–9 Children with B4SC obese BMI-for-age measurements, by demographic factor, South Canterbury DHB 2015

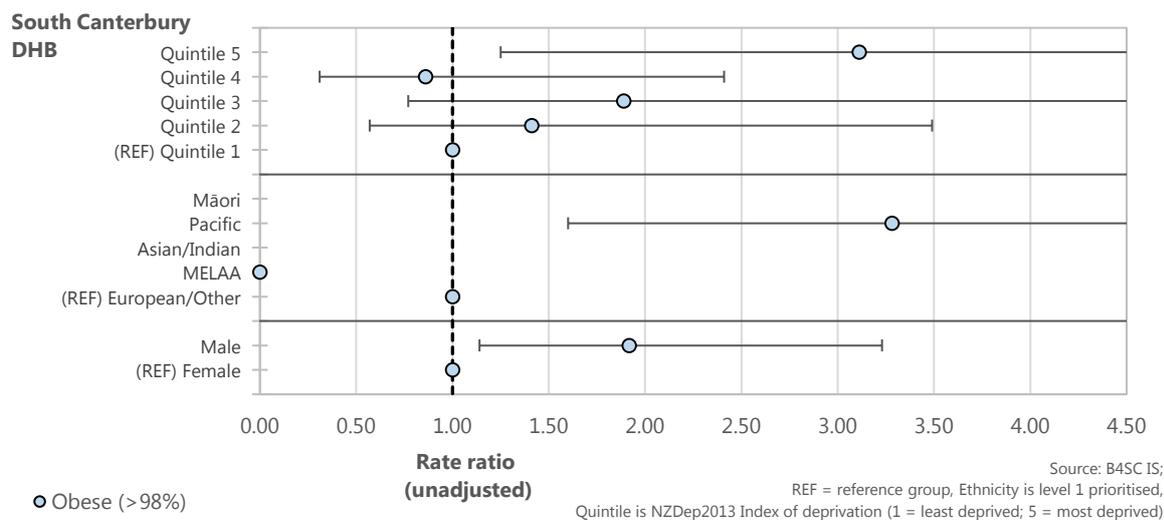


Figure VII-10 Children with B4SC obese BMI-for-age measurements, by demographic factor, Canterbury DHB 2015

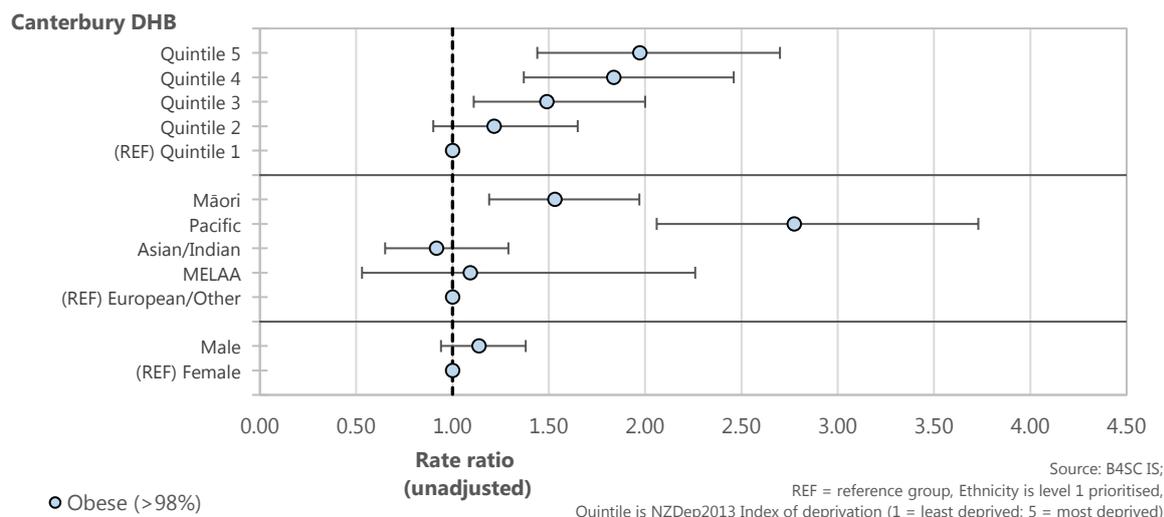
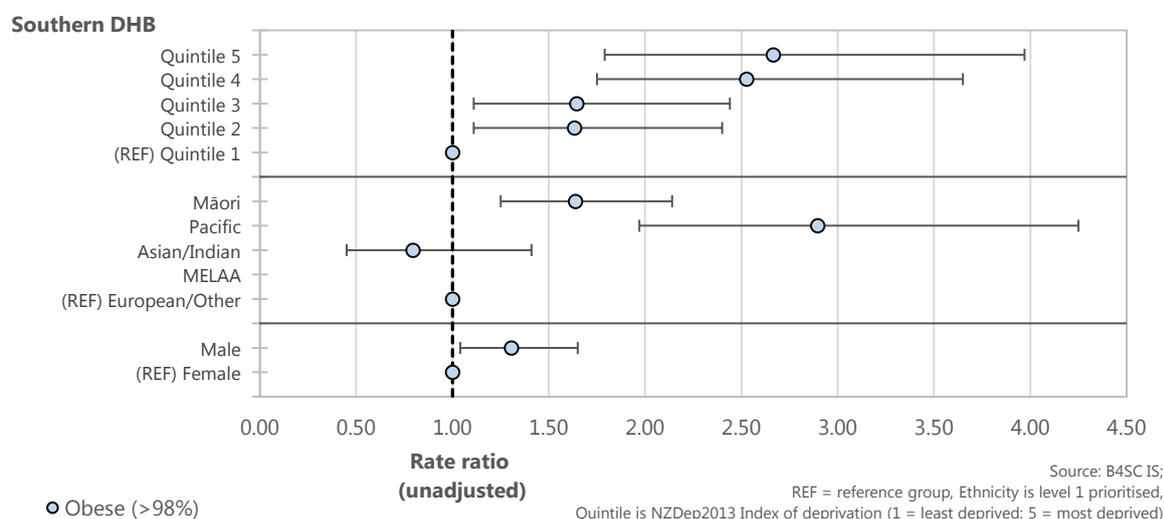


Figure VII-11 Children with B4SC obese BMI-for-age measurements, by demographic factor, Southern DHB 2015



Referral at B4 School Checks

The Ministry of Health’s *Raising Healthy Kids* target is that 95% of children identified as obese at B4 School Checks who should be referred to a health professional for further assessment and support.

Table VII-4 presents the referral status of children four years of age documented as obese at B4 School Checks for each South Island DHB in 2016. Due to small numbers of children documented on the West Coast, several values have been suppressed. Of the South Island DHBs, the referral rates were highest in South Canterbury DHB which reached a rate of over 70% for the referral of documented obese children but fell short of the Ministry’s 95% target. The referral rates in all other DHBs were at around 60%. On the West Coast five of the 12 documented children were offered referral.

Of those referred, and compared to all other South Island DHBs, South Canterbury DHB had a higher rate of referrals declined at 52.5% and Canterbury had the lowest rate at 9.4% (including referral declines from a child’s parent or caregiver, or declines from the service provider to which the child was referred).

Table VII-4 Referral status of children documented as obese at B4 School Check, South Island DHBs 2016

	2016 (n)	Rate		2016 (n)	Rate
Children who had BMI-for-age measured at a B4 School Check in 2016					
Nelson Marlborough			South Canterbury		
Declined	0	..	Declined	0	..
Under care	<5	s	Under care	<5	s
No referral required	12	12.63	No referral required	5	8.20
No referral required and advice given	21	22.11	No referral required and advice given	11	18.03
Referral required	61	64.21	Referral required	43	70.49
<i>Referred</i>	51	53.68	<i>Referred</i>	11	18.03
<i>Referral declined</i>	10	10.53	<i>Referral declined</i>	32	52.46
Total	95		Total	61	
Canterbury			West Coast		
Declined	<5	s	Declined	0	..
Under care	23	5.85	Under care	0	..
No referral required	27	6.87	No referral required	<5	s
No referral required and advice given	90	22.90	No referral required and advice given	6	50.00
Referral required	252	64.12	Referral required	5	41.67
<i>Referred</i>	215	54.71	<i>Referred</i>	<5	s
<i>Referral declined</i>	37	9.41	<i>Referral declined</i>	<5	s
Total	393		Total	12	
Southern DHB			New Zealand		
Declined	<5	s	Declined	40	0.87
Under care	15	5.40	Under care	185	4.01
No referral required	35	12.59	No referral required	596	12.91
No referral required and advice given	55	19.78	No referral required and advice given	817	17.70
Referral required	172	61.87	Referral required	2,979	64.52
<i>Referred</i>	87	31.29	<i>Referred</i>	2,151	46.59
<i>Referral declined</i>	85	30.58	<i>Referral declined</i>	828	17.93
Total	278		Total	4,617	

Source: B4SC IS; B4 School checks completed in: 2016. Rate per 100 obese children as documented in B4SC records

Evidence for good practice

Equity

There are social and ethnic inequalities in the prevalence of childhood obesity in New Zealand. The New Zealand Health Survey 2016/17 found that children living in the most deprived areas were two and a half times more likely to be obese than those living in the least deprived areas (after adjustment for age, sex, and ethnic group), and that 18% of Māori children and 29% of Pacific children were obese, compared to 9% of European children and 5.4% of Asian children.⁸ A higher prevalence of obesity in children from lower socio-economic groups is common in high-income countries.⁹

There is evidence that children in socioeconomically disadvantaged families have greater exposure to factors predictive of early childhood obesity, including unhealthy feeding practices (early introduction of solids, infant formula feeding, and being put to bed with a bottle), unhealthy maternal diet and more hours of television viewing.¹⁰⁻¹² Findings from the UK Millennium Cohort study suggest that maternal pre-pregnancy overweight and maternal smoking during pregnancy explain a considerable amount of the social inequalities in childhood overweight.^{13,14}

A 2014 systematic review by Laws et al.¹⁵ assessed the impact of interventions to prevent obesity or improve obesity-related behaviours in young children (0–5 years) from socioeconomically disadvantaged and/or indigenous families. The reviewers identified 32 studies altogether, but only two low quality studies involving indigenous groups (in the US). The interventions included intensive home visiting programs (typically for infants), and interventions in primary health care, preschool and community settings.

Mean differences between intervention and control groups ranged from -0.29 kg/m² to -0.54 kg/m² for body mass index (BMI = weight in kg ÷ (height in metres)²) and -2.9 to -25.6% for the prevalence of overweight/obesity. The interventions initiated in infancy (< 2 years) improved obesity-related behaviours (e.g. diet quality) but few of these studies measured longer-term effects on healthy weight gain. Studies involving pre-schoolers had mixed results, with the more successful interventions characterised by high levels of

parental engagement, the use of behaviour change techniques, and a focus on skill building (e.g. cooking skills, media literacy, communication, problem solving, conflict resolution and parenting skills), and links to community resources. Common features of the successful interventions for pre-schoolers were a dual focus on obesity prevention and school readiness, weight screening and referral, an educational component for parents, and a focus on household routines.

A 2015 review commissioned by the UK Department of Health¹⁶ aimed to assess how effective interventions are at reducing socioeconomic inequalities in obesity among children and adults. The child section of this review examined interventions at the individual, community and societal level for children aged 0–18 years (including prenatal). It included only studies that had a primary outcome that is a proxy for body fat, 76 in total (42 experimental and 34 observational), mostly of moderate or low quality. There were no studies on prenatal interventions and 19 on interventions for pre-schoolers. This review did not report on studies by age groups, but by level of intervention. Overall, it found that interventions do not increase inequalities and that there was most evidence for effectiveness for targeted primary school based environmental interventions, such as not selling unhealthy food and drink in school cafeterias and vending machines, and primary school delivered empowerment interventions, such as nutrition and physical activity education combined with exercise sessions. The review authors noted that the international evidence suggests that interventions are universally much more effective among school-aged children than among preschool children.

The same authors also wrote a narrative synthesis of the “best available” evidence for each intervention type, based on only the highest quality studies for each intervention type (23 studies in total, most from the US and of 6–12 year old children).¹⁷ This review found limited evidence that some individual and community based interventions may be effective in reducing socio-economic inequalities in obesity-related outcomes amongst children.

Prevention

Children who are overweight or obese are more likely to grow up to be overweight or obese as adults than children of normal weight, and overweight and obesity in adulthood is associated with increased risks of type 2 diabetes and cardiovascular disease, so addressing childhood obesity could potentially prevent health problems in later life.¹⁸

It can be easier for an overweight or obese child than an adult to attain normal weight status.¹⁹ In a child weight loss is not always needed to attain normal weight status: all that may be necessary is to reduce weight gain so that, as the child becomes taller, their weight becomes appropriate for their height.

The increase in obesity worldwide over the past few decades suggests a key role for environmental determinants as opposed to changes in human’s basic genetic code.²⁰ The World Health Organization has stated that obesity prevention and treatment requires a whole-of-government approach in which policies in all sectors systematically take health into account, and avoid harmful health impacts, thereby improving population health and health equity.²¹

- Actions at government level recommended by the World Health Organization include²¹:
- Developing and disseminating simple and accessible nutrition information aimed at both adults and children
- Providing children, parents, teachers and health professionals with guidance on healthy body size, sleep behaviours, physical activity and appropriate use of screen-based entertainment
- Taxing sugar-sweetened drinks
- Taking steps to reduce children’s exposure to marketing of unhealthy foods
- Requiring simple front-of-pack food and drink labelling so that consumers can easily assess a product’s nutritional value
- Requiring schools and childcare facilities to create healthy food environments
- Increasing access to healthy foods in disadvantaged communities
- Ensuring that schools and communities have adequate facilities for children’s physical activity during recreational time
- Incorporating obesity-prevention measures into antenatal care
- Collecting data on children’s BMI-for-age to monitor trends in childhood obesity

In the UK, as part of its childhood obesity reduction plan²², the government challenged the food and drinks industry to reduce overall sugar in the products that contribute most to children’s sugar intakes by 20%. The UK National Diet and Nutrition Survey indicated that the foods that contribute most to children’s sugar intake are

biscuits; breakfast cereals; cakes; chocolate confectionery; ice cream, lollies and sorbets; bakery products such as pastries, buns and waffles; puddings (including pies and tarts); sweet confectionery; sweet spreads and sauces; and yogurt and fromage frais.^{23,24}

There are three modifiable risk factors for child obesity in the prenatal period: maternal smoking, excessive weight gain during pregnancy, and gestational diabetes.²⁵ While there has been research on interventions to prevent maternal smoking and excessive gestational weight gain, there is currently little evidence that such interventions reduce child obesity because studies have not looked at this outcome.²⁶⁻²⁸ Some studies have reported on infant birth weight, but a 2014 review²⁸ found no statistically significant effect of interventions in pregnancy care on infant birth weight (9 studies, 1381 participants, fixed-effects analysis). Healthcare providers should ensure that counselling on nutrition, physical activity and smoking cessation is a standard component of antenatal care.²⁶

Many preschool children spend much of their day in childcare.²⁹ In a national survey conducted in Ireland, parents cited “other people minding their children” as one of the main barriers to providing a healthy diet for their child.³⁰ A 2016 systematic review³¹ of 15 studies of the association between childcare and the risk of overweight and obesity in children aged five years and under found that informal care (e.g. relatives, friends or neighbours) was consistently associated with higher BMI. The review authors suggested that grandparents who are less capable of physical activity and tend to “spoil” children by giving them palatable and high-calorie foods may be a reason for this. Centre-based care was associated with higher odds of overweight or obesity compared to parental care in some studies but other studies found no association or a protective effect.

Although a number of RCTs and quasi-RCTs have identified interventions for childcare services that have increased child physical activity and fundamental movement skill proficiency, improved child diet quality and prevented excessive weight gain, and evidence-based guidelines on healthy eating and physical activity for childcare centres have been produced, research suggests that implementation of obesity prevention policies and practices in childcare centres is often poor.³² A 2016 Cochrane review found little evidence for the effectiveness of strategies for improving child care centres’ implementation of policies and practices to promote healthy eating, physical activity and/or obesity prevention, improving staff knowledge or attitudes, or improving children’s diet, physical activity or weight status.

Short sleep duration is associated with obesity in children and adolescents.³³ A recent systematic review³⁴ of obesity prevention interventions that aimed to improve sleep duration (and reported on BMI, BMI percentile, dietary intake, or physical activity) found that when child sleep duration improved, there were improvements in child BMI, nutrition and physical activity. Most interventions, however, were not successful in changing children’s sleep duration.

It is important that interventions to prevent obesity do not inadvertently increase weight stigmatisation or encourage disordered eating (and so increase the risk of a child developing an eating disorder later in life), but instead promote the benefits of healthy eating and physical activity for everyone.³⁵

Treatment

Parents of overweight and obese children often do not perceive that their child has a problem.³⁶ The Growing Up in New Zealand study found that that majority, 73%, of overweight and obese children’s mothers thought that they were of normal weight.²⁹ Health professionals have an important role in sensitively helping parents of overweight children to recognise the problem and the need for action, and providing advice on healthy living.³⁷

The Clinical guidelines for weight management in New Zealand children and young people⁴ recommend that clinicians regularly measure children’s height and weight (ideally every 12 months) and, for children under five years, plot weight and height for age to determine weight and height centiles, and use these with the weight-height BMI conversion chart to determine BMI centile.³⁸ A BMI above the 91st centile indicates that a child is overweight and a BMI above the 98th centile that a child is obese.³⁹ The Ministry of Health’s Raising Healthy Kids health target is that, by December 2017, 95% of obese children identified in the B4 School Check programme will be offered a referral to a health professional for clinical assessment and family-based nutrition, activity and lifestyle interventions.⁴⁰

Child obesity interventions should aim to decrease the rate at which a child gains weight so that the child grows into their weight.⁴ There is limited evidence regarding interventions for overweight or obese preschool children⁴¹, so strategies need to draw on the evidence relating to older children. This evidence, which is generally not of high quality, indicates that multicomponent interventions that include diet, physical activity and behaviour-changing strategies may help achieve small, short to medium term reductions in BMI, BMI z score and weight.⁴²⁻⁴⁵ Examples of behavioural strategies are: not offering food as a reward or to soothe distress,

having a regular schedule for meal times, allowing children to stop eating rather than encouraging them to finish their food, having meals at the table rather than in front of the television, parental modelling of healthy eating habits, and not having unhealthy food in the house.⁴⁶

Effective interventions tend to be those with a family component, such as education for parents, or encouragement for obese parents to lose weight.⁴² Expert consensus is that a child is more likely to achieve a healthy weight if the whole family adopts a healthy lifestyle.⁴⁷

There is insufficient evidence to determine whether one type of eating pattern (e.g. low-fat, low-carbohydrate, low-glycaemic, or increased protein diets) is more effective for weight management than any other.⁴⁸⁻⁵⁰ There is consistent evidence that exercise produces modest reductions in BMI z score in obese children and adolescents⁵¹ so increasing physical activity should be part of weight management plans. Interventions to reduce sedentary behaviour in children are possibly effective in reducing BMI, but there is little evidence that they produce clinically significant reductions for obese children.⁵²⁻⁵⁴

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