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The prevalence of overweight and obesity in Indigenous kindergarten children

A cross sectional population based study

Background

This study investigated the prevalence of overweight and obese Indigenous kindergarten children in the Australian Capital Territory.

Methods

A retrospective analysis was performed on data collected as part of the Kindergarten Health Check, a cross sectional population based survey conducted in the ACT from 2004 to 2008.

Results

The prevalence of overweight and obesity was statistically significantly higher among Indigenous (18%) compared to non-Indigenous kindergarten children (14%) ($p=0.02$, $OR=1.40$, $95\% CI=1.051-1.862$). Ten percent of parents of normal weight children, and 16% of parents of overweight or obese children, reported concerns about weight and eating habits, with no significant difference between Indigenous and non-Indigenous parents.

Discussion

The low level of parental concern about obesity suggests that general practitioners should persist with screening for, and managing, overweight and obesity in kindergarten-aged children in similar jurisdictions on a proactive basis.

Keywords

indigenous health services; obesity, child, health

Obesity represents a significant health burden in Australia, with 54% of adults in 2004–05 found to be either overweight or obese,¹ and a projected 4.6 million Australians projected to be obese in the year 2025.² Of particular concern is the rapidly increasing prevalence of obesity among Australian children.² For example, a 2004 study of South Australian pre-school children aged 4 years showed the rates of overweight and obesity almost doubled over an 8 year period.³ While numerous studies have established an increased risk of overweight and obesity in Indigenous Australian adults,^{4–6} there is a paucity of data on the prevalence of overweight and obese Indigenous children.⁷ A 2010 study conducted in an urban Aboriginal medical service found that 36% of children who underwent an Aboriginal and Torres Strait Islander health check were overweight or obese, compared with only 21% of children who completed the 2006 Healthy Kids Queensland Survey.⁸

Overweight and obesity in children increases the likelihood of premature mortality and physical morbidity in later life, including diabetes, hypertension, ischaemic heart disease, stroke, asthma and polycystic ovarian syndrome,⁹ with Aboriginal and Torres Strait Islander children at higher risk.^{10–12} These problems are compounded by a lack of parental concern about obesity in the general Australian population,¹³ and desirability of weight gain among Indigenous parents.^{14,15}

This study investigated the prevalence of overweight and obese Indigenous kindergarten children in the Australian Capital Territory and

the frequency of self reported parental concern about weight and eating habits.

Methods

A retrospective analysis was performed on data collected as part of the Kindergarten Health Check, a cross sectional population based survey conducted in the ACT from 2004 to 2008.

Participants

All children enrolled in kindergarten, ie. the first year of full time school in the ACT during the years 2004–08, were invited to participate in the Kindergarten Health Check, part of the ACT Health Child, Youth and Women's Health program. Parents provided written consent for their child to participate, and completed a questionnaire covering demographic data, self reported Indigenous status, health history, and a number of questions. Those related to this study were a tick box option for each of weight and eating in response to the question: 'Do you have areas of concern about your child's health?' There was also space for parents to write comments as they wished.

Data collection

Once consent was received, the Academic Unit of General Practice collated the questionnaire data, and school health nurses performed the health checks, according to a pre-defined ACT Health Directorate protocol. This included height being measured to the nearest 0.1 cm using a stadiometer with shoes off, and weight to the nearest 0.1 kg using calibrated digital scales with jumper off. The International Obesity Task Force body mass index (BMI) cut-off points were used to classify overweight and obesity.¹⁶ As these are extrapolated graphically in a continuous curve, age at the date of the health check was calculated for each subject, and age categories were then

Table 1. Age and body mass index categories

Subject's age calculated to two decimal places	Age for purposes of BMI	Body mass index 25 kg/m ² equivalent (overweight)		Body mass index 30 kg/m ² equivalent (obese)	
		Males	Females	Males	Females
4.25–4.74	4.5	17.47	17.19	19.26	19.12
4.75–5.24	5.0	17.42	17.15	19.30	19.17
5.35–5.74	5.5	17.45	17.20	19.47	19.34
5.75–6.24	6.0	17.55	17.34	19.78	19.65
6.25–6.74	6.5	17.71	17.53	20.23	20.08

determined as close as possible to half years of age (Table 1). A BMI equal to or less than 13.8 was used to identify underweight children.

Where subjects were found to be over or underweight, according to the Centers for Disease Control and Prevention growth charts,¹⁷ nurses recommended that either their family doctor or an ACT health dietician review them. Parents who expressed concern about their child's weight or eating habits on the health questionnaire, were given a leaflet with information about nutrition.

Statistical analysis

All data was entered onto an Access database and then analysed using Predictive Analytics Software to calculate the *p* value (using χ^2 test), unadjusted odds ratio (OR) and 95% confidence intervals (CI).

Results

During the study period, of the 21 561 children enrolled in kindergarten in the ACT, 18 998 (88%) completed and returned the questionnaire;¹⁸ 482 (81%) were eligible for this study (Figure 1). Rates of overweight and obesity between the two groups fluctuated over the study period, with higher prevalence in the Indigenous subjects in 2004, 2005 and 2008; and higher prevalence in the non-Indigenous children in 2006 and 2007 (Figure 2). Across the study period, the prevalence of overweight and obesity was statistically significantly higher among Indigenous (18%) compared to non-Indigenous kindergarten children (14%) (*p*=0.020, OR=1.40, 95% CI=1.051–1.862) (Table 2). Ten percent of parents of normal weight children, and 16% of parents of overweight or obese children, reported concerns about weight and eating habits, with no significant difference between Indigenous and non-Indigenous parents (Table 3, Table 4).

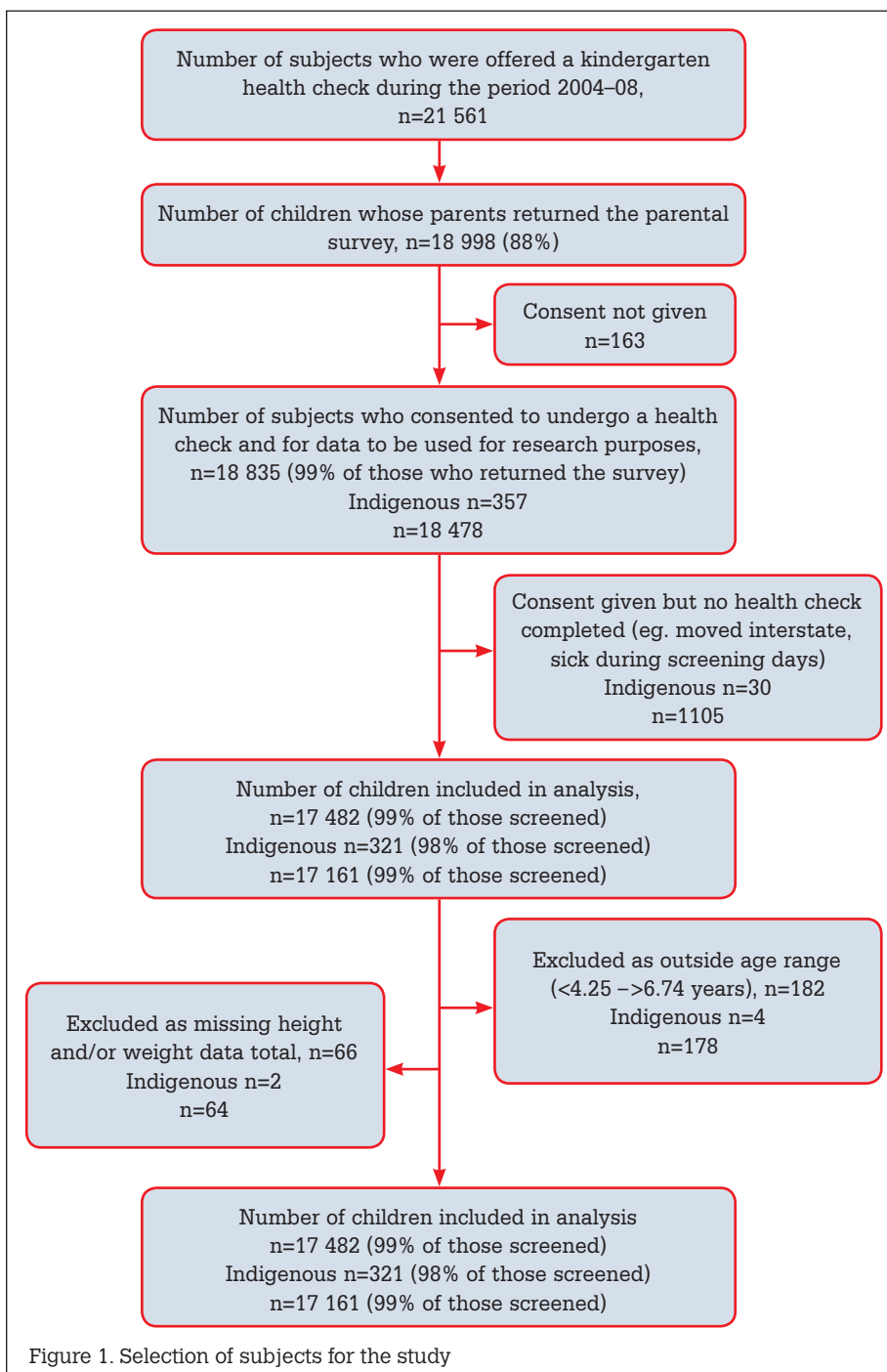


Figure 1. Selection of subjects for the study

Discussion

This study demonstrated a statistically significantly higher prevalence of overweight and obesity in Indigenous kindergarten children than their non-Indigenous counterparts. This cannot be explained by a lack of parental

concern or positive parental attitudes toward weight gain. In the absence of national data on overweight and obesity in Aboriginal and Torres Strait Islander children, this study provides further insight into the nature and extent of the problem. The reliability of the data

is assisted by the high response rate and that the proportion of Indigenous subjects in this study (1.8%) is similar to that of the Australian population (2.5%).¹⁷ The higher prevalence of overweight and obese children found in this study is consistent with previous research,⁴⁻⁶ and mirrors a broader national trend of increased burden of disease among Indigenous Australian children.¹⁹⁻²¹

Several government campaigns specifically targeted at childhood overweight and obesity coincided with the study period (2004–08). The ‘Go for 2&5’ campaign began in the ACT in 2005 and continued throughout the entire study period. Aimed at children aged 5–12 years and their parents, it encouraged daily consumption of fruit and vegetables.²² The ‘Get Moving’ campaign of 2006, targeted children aged 5 years and over, and promoted regular physical activity.²³ The ‘Get Set 4 Life – Habits for Healthy Kids’ campaign began in the final year of the study period (2008), and involved the distribution of an information booklet to parents regarding healthy eating, regular exercise and other children’s health issues.²⁴ Despite these numerous public health campaigns, only 16% of parents of overweight or obese children expressed any concern about their child’s weight and/or eating habits on the questionnaire.

One of the limitations of this research is its focus on kindergarten children. The greatest burden of childhood obesity may arise later, in early adolescence, when eating and exercise behaviours are more strongly linked to peer group influence and hormonal changes.²⁵ In addition, the age at which childhood obesity is an accurate predictor of obesity in adulthood remains uncertain.²⁶ In light of this, obesity during the kindergarten year may not be a reliable indicator of adult obesity and disease.

Implications for general practice

- Advertising campaigns may not be successful at raising parental awareness about weight and eating habits in children.
- Childhood obesity among kindergarten children remains a significant problem, particularly for Aboriginal and Torres Strait Islander children.
- The low level of parental concern for obesity suggests that GPs should persist with screening for, and managing, overweight and obesity

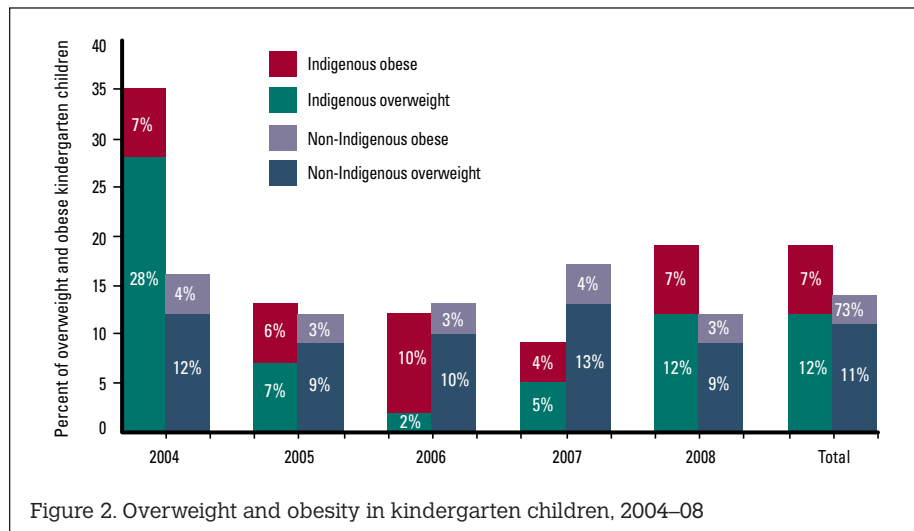


Figure 2. Overweight and obesity in kindergarten children, 2004–08

		Outcome – overweight and obesity		p value	Odds ratio	95% confidence interval
		Overweight or obese (%)	Healthy weight or underweight (%)			
Exposure – indigeneity	Indigenous (n=321)	59 (18)	262 (82)	0.020	1.401	1.051–1.862
	Non-Indigenous (n=17 161)	2378 (14)	14 783 (86)			

		Outcome – parental concern		p value	Odds ratio	95% confidence interval
		Parental concern (%)	No parental concern (%)			
Exposure – weight	Overweight or obese (n=2437)	380 (16)	2,057 (84)	0.000	1.612	1.428–1.820
	Healthy or underweight (n=15 045)	1547 (10)	13 498 (90)			

Table 4. Parental concern about obesity in Indigenous and non-Indigenous kindergarten children

		Outcome – parental concern		p value	Odds ratio	95% confidence interval
		Parental concern (%)	No parental concern (%)			
Exposure – indigeneity	Indigenous (n=321)	42 (13)	279 (87)	0.234	0.820	0.591–1.138
	Non-Indigenous (n=17 161)	1885 (11)	15 276 (89)			

in kindergarten aged children in similar jurisdictions on a proactive basis.

- Ongoing research will help to better define and manage the complex dynamics around childhood obesity.

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The authors acknowledge the diversity of Indigenous peoples in Australia and the problematic nature of attempting to adequately reflect that diversity with suitable terminology. In this article, the use of the term ‘Indigenous’, unless otherwise evident by the context of its use, should be taken to include Aboriginal and Torres Strait Islander peoples.

References

1. Linacre S. In: Australian Bureau of Statistics. Australian social trends 2007 (4102.0). Overweight and obesity. Canberra: ABS, 2007.
2. Boxall AM. Obesity prevention in young children: what does the evidence say? Canberra: Background Note for the Parliament of Australia; 1 May 2009. Available at www.parliament.wa.gov.au/intranet/libpages.nsf/WebFiles/Hot+topics+

+child+obesity+APH+09/\$FILE/ObesityChildren[1].pdf [Accessed 3 August 2011].

3. Vaska V, Volkmer R. Increasing prevalence of obesity in South Australian 4-year-olds: 1995–2002. *J Paediatr Child Health* 2004;40:353–5.
4. Burns J, Thomson N. Overweight and obesity – a major problem for Indigenous Australians. *Australian Indigenous Health Bulletin*. October–December 2006. Available at www.healthinfonet.ecu.edu.au/uploads/resources/13774_bulletin_briefreports_burns.pdf [Accessed 3 August 2011].
5. Australian Bureau of Statistics. National Aboriginal and Torres Strait Islander Health Survey: Australia, 2004–05 (4715.0). Canberra: ABS, 2006.
6. Australian Institute of Health and Welfare. Australia’s health 2010. Who’s health? How population groups vary. Canberra: AIHW, 2010.
7. Australian Institute of Health and Welfare. A picture of Australia’s children 2009. Health and wellbeing of Indigenous children. Canberra: AIHW, 2009.
8. Fonda AR, Spurling GK, Askew DA, et al. Using child health checks to assess the prevalence of overweight and obesity among urban Indigenous children. *Med J Aust* 2010;192:596.
9. Reilly JJ, Kelly J. Long-term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: systematic review. *Int J Obes* 2011;35:891–8.
10. Power C, Jefferis B. Fetal environment and subsequent obesity: a study of maternal smoking. *Int J Epidemiol* 2002;31:413–9.
11. Al Mamun A, Lawlor D, Alati R, et al. Does maternal smoking during pregnancy have a direct effect on future offspring obesity? Evidence from a prospective birth cohort study. *Am J Epidemiol* 2006;164:317–25.
12. Australian Institute of Health and Welfare. Tobacco smoking in Australia: a snapshot, 2004–05 (4831.0.55.001). Canberra: AIHW, 2006.
13. Campbell M, Williams J, Hampton A, et al. Maternal concern and perceptions of overweight in Australian preschool-aged children. *Med J Aust* 2006;184:274–7.
14. Cinelli RL, O’Dea JA. Body image and obesity among Australian adolescents from Indigenous and Anglo-European backgrounds: implications for health promotion and obesity prevention among Aboriginal youth. *Health Educ Res* 2009;24:1059–68.
15. O’Dea JA. Gender, ethnicity, culture and social class influences on childhood obesity among

Australian schoolchildren: implications for treatment, prevention and community education. *Health Soc Care Community* 2008;16:282–90.

16. Cole TJ, Bellizzi MC, Flegal KM, et al. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ* 2000;320:1240–3.
17. The National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion. CDC Clinical Growth Charts. Atlanta: Centers for Disease Control and Prevention, 2000.
18. Australian Bureau of Statistics. Population Distribution, Aboriginal and Torres Strait Islander Australians, 2006 (4705.0). Canberra: ABS, 2007.
19. Smith MT, Lester-Smith D, Zurynski Y, et al. Persistence of acute rheumatic fever in a tertiary children’s hospital. *J Paediatr Child Health* 2011;47:198–203.
20. Massey P, Durrheim D. Aboriginal and Torres Strait Islander peoples at higher risk of invasive meningococcal disease in NSW. *NSW Public Health Bull* 2008;19:100–3.
21. White A, Wong W, Sureshkumar P, et al. The burden of kidney disease in indigenous children of Australia and New Zealand, epidemiology, antecedent factors and progression to chronic kidney disease. *J Paediatr Child Health* 2010;46:504–9.
22. Go for 2&5. Australian Government Department of Health and Ageing. 10 November 2008. About the campaign. Available at www.health.gov.au/internet/healthyactive/publishing.nsf/Content/about [Accessed 3 August 2011].
23. Get Moving. Australian Government Department of Health and Ageing. 10 November 2008. Evaluation of the National Get Moving Campaign. January 2007. Available at www.health.gov.au/internet/healthyactive/publishing.nsf/Content/getmoving [Accessed 3 August 2011].
24. Australian Department of Health and Ageing. MBS Primary Care Items. Available at www.health.gov.au/internet/main/publishing.nsf/Content/Health_Kids_Check_GetSet4Life+Guide [Accessed 3 August 2011].
25. McCarthy A, Hughes R, Tilling K, et al. Birth weight; postnatal, infant, and childhood growth; and obesity in young adulthood: evidence from the Barry Caerphilly Growth Study. *Am J Clin Nutr* 2007;86:907–13.
26. Macdonald-Wallis K, Jago R, Page AS, et al. School-based friendship networks and children’s physical activity: a spatial analytical approach. *Soc Sci Med* 2011;73:6–12.

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