

Prevalence and recent trends in overweight, obesity and severe obesity among New Zealand adolescents

Jennifer Utter, PhD, MPH (corresponding author)
Epidemiology & Biostatistics, School of Population Health
University of Auckland
Private Bag 92019
Auckland, New Zealand
j.utter@auckland.ac.nz

Simon Denny, PhD
Paediatrics: Child and Youth Health
University of Auckland
Private Bag 92019
Auckland, New Zealand
s.denny@auckland.ac.nz

Tasileta Teevale, PhD
Pacific Development
University of Otago
tasileta.teevale@otago.ac.nz

Roshini Peiris-John, PhD
Epidemiology & Biostatistics, School of Population Health
University of Auckland
Private Bag 92019
Auckland, New Zealand
r.peiris-john@auckland.ac.nz

Ben Dyson, PhD
Faculty of Education
University of Auckland
Private Bag 92019
Auckland, New Zealand
b.dyson@auckland.ac.nz

Key words: adolescent; New Zealand; obesity; severe obesity

Running title: Recent trends in adolescent obesity in New Zealand

Funding source: Funding for the current study was provided by a consortium of eight government agencies: the Ministry of Youth Development, the Ministry of Social Development, the Ministry of Education, the Ministry of Health, the Ministry of Justice, the Department of Labour, the Health Promotion Agency, and the Families Commission.

Abstract

Background: Around the world, there have been numerous reports of a levelling of the prevalence of obesity. As New Zealand has among the highest rates of child and adult obesity in the OECD, the aim of the current study was to document the prevalence of and recent trends in overweight, obesity and severe obesity among adolescents in New Zealand.

Methods: Data were collected as part of two nationally representative surveys in 2007 and 2012. In both surveys, a nationally representative group of students was selected to participate in the health and wellbeing surveys from a nationally representative sample of secondary schools. Across the two surveys, more than 17,000 students participated in the survey which also included measured heights and weights.

Results: In 2012, nearly 40% of adolescents in New Zealand were overweight, obese or severely obese. Between 2007 and 2012, there were no decreases in the prevalence of obesity for the general population or any demographic subgroup. However, the prevalence of obesity and severe obesity for Pacific young people increased significantly. Of note, the prevalence of severe obesity for Pacific young people increased from 9% in 2007 to 14% in 2012.

Conclusions: Findings from the current study indicate the need for an urgent investment in obesity prevention, particularly to address the growing inequalities in obesity for Pacific young people.

Introduction

After several decades of a steady increase in obesity, recent data from the US has suggested that the prevalence of obesity may be starting to plateau.^{1,2} However, these findings were not uniform across the population as men and adolescent boys appeared to still be experiencing increases in obesity through 2010. Moreover, there have been no notable movements towards decreasing the ethnic inequalities in the burden of obesity.

New Zealand has the third highest rates of obesity in the OECD (Organisation for Economic Co-operation and Development),³ for both adults and children. Nearly one-third (30%) of adults in New Zealand are obese;⁴ this is similar to the prevalence of obesity in Australia (28%)⁵ and the US (35%).⁶ Data on adolescent obesity in New Zealand is extremely limited as the only frequent and routine health survey conducted includes relatively small numbers of adolescents. A small regional study of adolescent obesity in New Zealand found the prevalence of obesity increased markedly from 19% to 31% between 1997 and 2005.⁷ Obesity during adolescence is a significant indicator as approximately 90% of adolescents with obesity remain obese into adulthood.⁸

The objectives of the current study are to: document the prevalence of and recent trends in overweight, obesity and severe obesity among two nationally representative samples of adolescents in New Zealand and determine if changes in obesity are similar for all sociodemographic sub-groups in the population.

Methods

Data for the current study were collected as part of two nationally representative surveys of the health and wellbeing of high school students in New Zealand in 2007 (Youth'07) and 2012 (Youth'12).^{9,10} Both surveys adopted a two stage sampling procedure where first schools, then students within schools, were randomly selected for participation. In 2007, 9107 students from 96

schools participated reflecting response rates for schools and students at 84% and 74%, respectively. In 2012, 8500 students from 91 schools participated reflecting response rates for schools and students at 73% and 68%, respectively.

In both surveys, consent for participation was obtained from school principals on behalf of the Boards of Trustees. In both surveys, students and their parents were provided with information sheets about the survey. Students consented themselves to participate in the survey. The University of Auckland Human Subject Ethics Committee granted ethical approval for both surveys.

All data collection took place at school, during the school day. All data were collected anonymously. Students were assigned a unique identifier which was they used to log into the survey and for recording their height, weight, and residential meshblock. Students were weighed and measured in light clothing without shoes by trained research staff using digital scales and portable stadiometers. BMI was calculated as weight (kilograms) / height (metres)². Overweight, obesity and severe obesity were defined using the criteria recommended by the International Obesity Task Force (IOTF).^{11, 12} The BMI cut points for overweight, obesity and severe obesity are made by age and sex and are based on pooled international data. The cut points correspond to an adult BMI of 25 (overweight), 30 (obesity) and 35 (severe obesity).

Demographic and socioeconomic data were measured by self-report. Ethnicity was assessed using the standard measures developed for the New Zealand census¹³ where participants can select all of the ethnic groups that they identify with. To facilitate statistical analyses, discrete ethnic populations were created using a prioritization method where students were assigned to one ethnic group in the following order: Māori (Indigenous people of New Zealand), Pacific (includes Samoa, Tonga, Cook Island, and other Pacific Islands), Asian, Other ethnicity, European.¹³ In both surveys students orally provided their residential address, to identify and record their geographic meshblock of residence. This meshblock is a small area of approximately 100 residents. The meshblock was then linked to the New Zealand Index of Deprivation to measure area level deprivation¹⁴ and also used to determine

urban/ rural residence. Household poverty was assessed by the presence of any two of the following eight indicators: household food insecurity (often/ all the time), moving homes frequently (2 or more times in past year), not having working car at home, not having a telephone at home, not having a computer at home, overcrowding (more than 2 people per bedroom), both parents unemployed, and use of rooms other than bedrooms for sleeping (e.g. living room, garage).

All analyses were conducted using SAS software (Cary, NC) and accounted for the weighting and clustering of the data. The prevalence of overweight, obesity and severe obesity were generated to describe the population (and demographic subgroups) in both 2007 and 2012. To determine differences in the prevalence of overweight, obesity and severe obesity between the two time points, logistic regression models were generated. Lastly, regression models which included interaction terms between variables of interest were created to determine if changes in body size over time were moderated by any demographic or socioeconomic variables. All differences were considered statistically significant at $p < 0.05$.

Results

In 2012, nearly 40% of adolescents in secondary school in New Zealand were overweight, obese or severely obese (Table 1). There were few or no differences in the prevalence of obesity by age, gender or urban/rural residence, but there were some notable differences by ethnicity and socioeconomic indicators. The prevalence of obesity (plus severe obesity) was higher among students living in high deprivation areas (22%) and for student living with poverty (26%) compared more affluent students (6% for students in low deprivation areas and 10% for students not living with poverty). Approximately 67% of Pacific students met the criteria for overweight, obesity or severe obesity, compared with 44% of Maori students, 29% of European students, and 23% of Asian students.

Between 2007 and 2012, there were no changes in the prevalence of overweight, obesity or severe obesity for the general population. However, the prevalence of obesity and severe obesity increased for Pacific young people from 27% in 2007 to 34% in 2012 ($p=0.02$). Of note, the prevalence of severe obesity alone for Pacific young people increased from 9% in 2007 to 14% in 2012. There were no other increases in the prevalence of overweight, obesity or severe obesity for any sub-group of the population.

Discussion

The current study aimed to document timely data on the prevalence of overweight, obesity and severe obesity among adolescents in New Zealand and to determine if there have been any recent improvements in adolescent obesity for the general population or any demographic sub-group of the population.

The prevalence of overweight, obesity and severe obesity among adolescents in New Zealand remained high through 2012 at just below 40%. Moreover, there have been no improvements in obesity across the general population or for any demographic sub-group between 2007 and 2012 and the prevalence of obesity and severe obesity was significantly worse for Pacific adolescents. Of particular concern, the prevalence of severe obesity among Pacific young people increased by more than 50% between 2007 and 2012.

Our findings expand on what was reported during the last national health surveys conducted across the whole population of New Zealand. The NZ Health Survey found the prevalence of obesity in children (2-14 years) increased from 8% to 10% between 2006/07 and 2011/12, but this was only significant for boys. For young adults (15-24 years) the prevalence of obesity increased from 14% to 20% between the two surveys.^{15, 16} Moreover, the prevalence of obesity (excluding overweight) for

Pacific people in New Zealand remained high in the 2011/2012 Health survey, with 25% of Pacific children (aged 2-14) and 67% of Pacific adults experiencing obesity.

Comprehensive strategies and leadership are needed to address childhood obesity. The Robert Wood Johnson Foundation reported significant reductions in child obesity across several cities in the US, all of which have enacted comprehensive policies to address childhood obesity.¹⁷ Findings presented in the current study generally reflect the lack of government resource directed at obesity prevention over the past six years.¹⁸ In 2008, New Zealand experienced a change in government leadership and major obesity prevention initiatives were either dismissed or lost funding.¹⁸ One such programme, Healthy Eating Healthy Action,¹⁹ provided support and resources for community-based initiatives to reduce ethnic inequalities in obesity. Programs to reduce inequalities in obesity are particularly important for New Zealand as Pacific people are over-represented on multiple indicators of poverty and deprivation, resulting in multiple indicators of poor health.²⁰

In summary, since 2007 the burden of obesity among adolescents in New Zealand has not improved, and for Pacific young people has become significantly worse. Political leadership, advocacy, significant improvements to the food environment, increased opportunities for physical activity and culturally-relevant and effective weight management programmes will be needed to reduce the high prevalence of obesity and curb the growing inequalities for Pacific populations.

Acknowledgements: Funding for the current study was provided by a consortium of eight government agencies: the Ministry of Youth Development, the Ministry of Social Development, the Ministry of Education, the Ministry of Health, the Ministry of Justice, the Department of Labour, the Health Promotion Agency, and the Families Commission. JU conducted the data analysis and drafted the manuscript. All authors contributed to study design, data collection, interpretation of findings, and critically reviewed the manuscript.

Authors Disclosure Statement: No competing financial interests exist.

References

1. Flegal KM, Carroll MD, Kit BK, et al. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *JAMA*. 2012;307(5):491-7.
2. Ogden CL, Carroll MD, Kit BK, et al. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *JAMA*. 2012;307(5):483-90.
3. OECD Directorate for Employment Labour and Social Affairs. Obesity Update. Paris: OECD; 2014 June. Contract.
4. Ministry of Health. Understanding excess body weight: New Zealand Health Survey. Wellington: Ministry of Health; 2015.
5. Australian Bureau of Statistics. Australian Health Survey: First Results, 2011-2012. Canberra: Australian Bureau of Statistics; 2011.
6. Ogden CL, Carroll MD, Kit BK, et al. Prevalence of childhood and adult obesity in the United States, 2011-2012. *JAMA*. 2014;311(8):806-14.
7. Utter J, Scragg R, Denny S, et al. Trends in body mass index and waist circumference among New Zealand adolescents, 1997/1998-2005. *Obes Rev*. 2009;10(4):378-82.
8. Gordon-Larsen P, The NS, Adair LS. Longitudinal trends in obesity in the United States from adolescence to the third decade of life. *Obesity (Silver Spring)*. 2010;18(9):1801-4.
9. Adolescent Health Research Group. Youth'07: The Health and Wellbeing of Secondary School Students in New Zealand. Technical Report. Auckland: University of Auckland; 2008. Contract.
10. Clark T, Fleming T, Bullen P, et al. Health and well-being of secondary school students in New Zealand: trends between 2001, 2007 and 2012. *J Paediatr Child Health*. 2013;49(11):925-34.
11. Cole TJ, Bellizzi MC, Flegal KM, et al. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ*. 2000;320(7244):1240-3.
12. Cole TJ, Lobstein T. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatr Obes*. 2012;7(4):284-94.
13. Statistics New Zealand. Statistical Standard for Ethnicity. Wellington: Statistics New Zealand; 2005. Contract.
14. Atkinson J, Salmond C, Crampton P. NZDep2013 Index of Deprivation. Wellington: University of Otago; 2014. Contract.
15. Ministry of Health. The Health of New Zealand Adults 2011/12: Key findings of the New Zealand Health Survey. Wellington: Ministry of Health; 2012.
16. Ministry of Health. The Health of New Zealand Children 2011/12: Key findings of the New Zealand Health Survey. Wellington: Ministry of Health; 2012.
17. Robert Wood Johnson Foundation. Declining childhood obesity rates - where are we seeing the most progress? Washington, DC: Robert Wood Johnson Foundation; 2012 September. Contract.
18. Swinburn B, Wood A. Progress on obesity prevention over 20 years in Australia and New Zealand. *Obes Rev*. 2013;14 Suppl 2:60-8.
19. Ministry of Health. Healthy Eating - Healthy Action Oranga Kai - Oranga Pumau: A strategic framework. Wellington: Ministry of Health; 2003.
20. Statistics New Zealand and Ministry of Pacific Island Affairs. Health and Pacific peoples in New Zealand. Wellington: Statistics New Zealand and Ministry of Pacific Island Affairs; 2011.