



ISSN 1177-083X



ISSN: (Print) 1177-083X (Online) Journal homepage: <https://www.tandfonline.com/loi/tnzk20>

## Rising food security concerns among New Zealand adolescents and association with health and wellbeing

Jennifer Utter, Betty T. Izumi, Simon Denny, Theresa Fleming & Terryann Clark

To cite this article: Jennifer Utter, Betty T. Izumi, Simon Denny, Theresa Fleming & Terryann Clark (2018) Rising food security concerns among New Zealand adolescents and association with health and wellbeing, *Kōtuitui: New Zealand Journal of Social Sciences Online*, 13:1, 29-38, DOI: [10.1080/1177083X.2017.1398175](https://doi.org/10.1080/1177083X.2017.1398175)

To link to this article: <https://doi.org/10.1080/1177083X.2017.1398175>



© 2017 The Royal Society of New Zealand



Published online: 13 Nov 2017.



[Submit your article to this journal](#)



Article views: 7735



[View related articles](#)



[View Crossmark data](#)



Citing articles: 1 [View citing articles](#)

RESEARCH ARTICLE



## Rising food security concerns among New Zealand adolescents and association with health and wellbeing

Jennifer Utter <sup>a</sup>, Betty T. Izumi<sup>b</sup>, Simon Denny<sup>c</sup>, Theresa Fleming<sup>c</sup> and Terryann Clark<sup>d</sup>

<sup>a</sup>School of Population Health, University of Auckland, Auckland, New Zealand; <sup>b</sup>OHSU-PSU School of Public Health, Portland State University, Portland, OR, USA; <sup>c</sup>School of Medicine, University of Auckland, Auckland, New Zealand; <sup>d</sup>School of Nursing, University of Auckland, Auckland, New Zealand

### ABSTRACT

The current paper explores recent changes in food insecurity among adolescents and determine if food security concerns are associated with poorer wellbeing. Data were collected as part of two nationally representative surveys of the health and wellbeing of high-school students in New Zealand in 2007 and 2012. In 2012, 11% of young people reported food security concerns often or always, with 33% reporting food security concerns occasionally/sometimes. The prevalence of food security concerns at both frequencies increased significantly from 2007 (8% and 28%, respectively). Young people with food security concerns were more likely to report poor indicators of health and wellbeing, including truancy, poor general health, mental health concerns and obesity. Our findings highlight the growing concerns of food insecurity reported by adolescents in New Zealand. Interventions that address food security for families may provide a tangible means of promoting the healthy development of children and young people.

### ARTICLE HISTORY

Received 27 March 2017  
Accepted 25 October 2017

### KEYWORDS

Food security; mental health; wellbeing; adolescent

Household food insecurity poses a significant threat to the healthy development of children and young people (Cook and Frank 2008; Shtasel-Gottlieb et al. 2015). Adolescents who live with food insecurity are more likely to be overweight (Widome et al. 2009; Utter et al. 2012) and have poorer diets overall (Utter et al. 2012; Fram et al. 2015). In addition, young people who live in households with concerns about food security get lower grades at school and are more likely to have been suspended (Alaimo et al. 2001). Adolescents experiencing food insecurity experience a greater burden of mental health concerns, including greater emotional difficulties (Poole-Di Salvo et al. 2016), mental disorders (Burke et al. 2016), suicide behaviours (Alaimo et al. 2002) and lower health related quality of life (Casey et al. 2005). Though the nature of the relationship between food insecurity and poor adolescent health indicators are not fully understood, it has been hypothesised that they are likely explained either through poor nutrition, family stress or as an indicator of socio-economic deprivation (Cook and Frank 2008).

Household food insecurity affects a high proportion of the population in high-income countries. In 2014, 14% of American households were food insecure (Coleman-Jensen et al. 2015). In the UK, nearly 5% of adults have gone an entire day without anything to eat because of food insecurity (Taylor and Loopstra 2016). In a survey of New Zealand adults in 2008/2009, 7% reported low-food security, with an additional one-third being only moderately food secure (University of Otago and Ministry of Health 2011). Food insecurity among New Zealand households with children is even greater, with 20% reporting that they could not always afford to ‘eat properly’ (Ministry of Health 2003) in 2002.

Food insecurity is an indicator of socio-economic distress and hardship (Denny et al. 2016), but not all families experiencing economic hardship are food insecure, and vice versa. In New Zealand, more than 10% of adults who are employed (14%), have achieved university-level degrees (11%), and own their own homes (11%) experience food insecurity (Carter et al. 2010). Food insecurity is also unique in that it poses a distinct stress on families and affects the quality and quantity of foods that families consume (Drewnowski and Specter 2004; Utter et al. 2012). Given the pervasiveness of food insecurity across the population and the potential effects on the healthy development of children and adolescents, research that documents ongoing trends in food security and the associations with indicators of health and wellbeing is needed.

The aim of the current paper is to describe the prevalence of food security concerns in New Zealand, as viewed by adolescents. Specifically, the current research will explore recent changes in the prevalence of food insecurity (between 2007 and 2012) and determine if food security concerns are associated with poorer indicators of health and wellbeing of young people.

## 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) (Adolescent Health Research Group 2008; Clark et al. 2013). 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 and could decline their child’s participation in 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 was anonymous and took place at school, during the school day. Both surveys were administered on internet tablets, with audio content so that students could listen to all questions through headphones. Demographic and socio-economic data were measured by self-report. Ethnicity was assessed using the standard measures developed for the New Zealand census (Statistics New Zealand 2005) where participants can select all of the ethnic groups that they identify with. To facilitate statistical analyses,

discrete ethnic populations were created using a prioritisation 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 (Statistics New Zealand 2005). In both surveys students orally provided their residential address, to identify and record their geographic mesh-block of residence. The meshblock was then linked to the New Zealand Index of Deprivation to measure area level deprivation (Atkinson et al. 2014) and also used to determine urban/rural residence, based on geographic definitions determined by Statistics New Zealand. Urban areas include main urban areas ( $\geq 30,000$  people), secondary urban areas (10,000–29,999 people), and minor urban areas (1000–9999 people). Rural areas included less than 1000 people.

Food security concerns were assessed with the item, ‘Do your parents, or the people who act as your parents, ever worry about not having enough money to buy food?’ with five response options ranging in frequency from ‘never’ to ‘all the time’. Response options were collapsed to create three categories, ‘never’, ‘occasionally/ sometimes’, or ‘often/ all the time’.

Skipping school was assessed with the item, ‘In the last 12 months, have you wagged or skipped school for a full day or more without an excuse?’ (yes/ no). School results was assessed with the question ‘How well do you do at school (how good are your school results)?’ with the responses dichotomised as ‘near the top; above middle; or about middle’ and ‘below the middle or near the bottom’. General health was assessed with the item, ‘In general how would you say your health is?’ with five responses ranging from ‘excellent’ to ‘poor’. Students who replied that their health was excellent, very good or good were defined as having good general health.

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) squared. Overweight, obesity and underweight were defined using the criteria recommended by the International Obesity Task Force (IOTF) (Cole et al. 2000; Cole and Lobstein 2012).

Emotional wellbeing was assessed with the World Health Organization Wellbeing Index, a five item scale assessing constructs of positive mood, vitality and general interests (Bech et al. 2003). Higher scores indicate greater levels of wellbeing. *Depressive symptoms* were assessed using the previously validated Reynolds Adolescent Depression Scale – short form (Reynolds 2004) and has been validated for use with adolescents in New Zealand (Milfont et al. 2008). The score includes 10 items with 4 point Likert response options. Higher scores indicate greater depressive symptoms. Suicide attempt was assessed with the question, ‘During the past 12 months have you tried to kill yourself (attempted suicide)?’ Students who responded ‘once or twice’ or more often were considered to have made a suicide attempt.

## Analyses

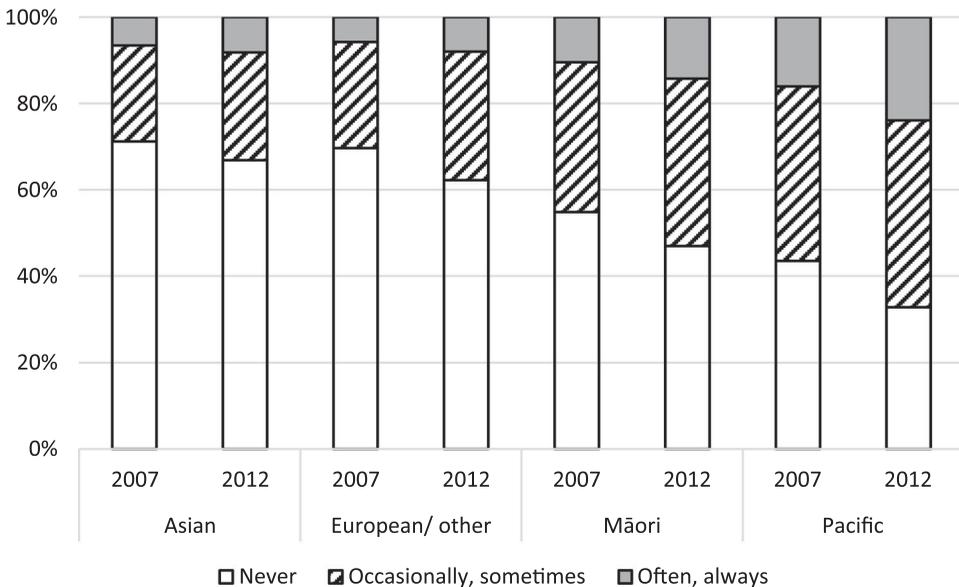
All analyses were conducted using SAS software v9.4 (Cary, NC) and accounted for the weighting and clustering of the data. The proportions of students reporting food security concerns were generated to describe the population (and demographic sub-groups) in both 2007 and 2012. To determine differences in the prevalence of food security concerns

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 food security concerns over time were moderated by any demographic or socio-economic variables.

The associations between food security concerns and indicators of health and wellbeing were examined with the 2012 dataset. For the dependent variables of depressive symptoms and emotional wellbeing, separate linear regression models were created treating food security as the independent variable and age, sex, ethnicity, area deprivation and urbanicity as co-variables. For the remaining dependent variables, the bivariate relationship between food security and the health and wellbeing indicators are indicated with percentages. Logistic regression models tested the independent effects of food security concerns while controlling for age, sex, ethnicity, area deprivation and urbanicity. All differences were considered statistically significant at  $p < .05$ .

## Results

In 2012, 11% of young people reported food security concerns often or always, with an additional 33% reporting food security concerns occasionally or sometimes (Table 1). The prevalence of food security concerns at both frequencies increased significantly from 2007 (8% and 28%, respectively). Moreover, the prevalence of food security concerns (often or always) increased consistently across many socio-demographic sub-groups of young people. Specifically, increases in food security concerns were similar by gender, ethnicity, area level deprivation and urbanicity ( $p$ -values for interactions all greater than .05). However, reports of food security concerns appeared to increase more for 14 and 15-year-old students, compared to younger and older students.



**Figure 1.** Visual representation of prevalence of food insecurity among New Zealand adolescents between 2007 and 2012, by ethnicity.

**Table 1.** Frequency of food security concerns of New Zealand adolescents in 2007 and 2012, by socio-demographic characteristics.

	Frequency of food security concerns								<i>p</i> -Value <sup>b</sup>	<i>p</i> -Value <sup>c</sup>	
	<i>n</i>	Never		Occasionally, sometimes		Often, always		<i>p</i> -Value <sup>b</sup>			<i>p</i> -Value <sup>c</sup>
		%	95% CI <sup>a</sup>	%	95% CI	%	95% CI				
<i>Total</i>											
2007	8431	64.4	61.5, 67.4	27.8	25.7, 29.9	7.8	6.8, 8.8				
2012	7986	55.7	52.5, 58.8	32.8	31.0, 34.7	11.5	9.8, 13.1	<.001			
<i>By sex</i>											
<i>Females</i>											
2007	3870	62.4	59.2, 65.6	28.5	26.1, 30.8	9.1	7.8, 10.4				
2012	4336	54.9	50.6, 59.2	33.0	30.4, 35.7	12.1	9.9, 14.2				
<i>Males</i>											
2007	4561	66.1	62.4, 69.8	27.2	24.4, 30.0	6.7	5.4, 7.9				
2012	3647	56.5	53.3, 59.8	32.6	30.6, 34.7	10.8	9.1, 12.6	.42	.15		
<i>By age</i>											
<i>≤13 years</i>											
2007	1671	56.4	52.9, 59.8	33.2	30.3, 36.0	10.5	8.7, 12.2				
2012	1691	50.2	46.8, 53.7	37.1	34.3, 39.9	12.7	10.7, 14.7				
<i>14 years</i>											
2007	1931	62.1	59.1, 65.1	30.1	27.5, 32.7	7.8	6.4, 9.2				
2012	1791	51.3	47.2, 55.3	36.0	33.0, 39.0	12.7	10.3, 15.2				
<i>15 years</i>											
2007	1849	66.7	63.4, 70.1	25.7	23.1, 28.3	7.6	5.8, 9.4				
2012	1651	54.5	50.4, 58.5	33.6	30.7, 36.4	12.0	10.0, 14.0				
<i>16 years</i>											
2007	1631	68.6	64.7, 72.6	24.5	21.4, 27.6	6.9	5.3, 8.4				
2012	1500	59.6	55.7, 63.4	29.6	27.0, 32.3	10.8	8.4, 13.2				
<i>≥17 years</i>											
2007	1349	69.4	65.5, 73.3	24.6	21.6, 27.7	5.9	4.6, 7.3				
2012	1342	65.5	61.6, 69.4	25.9	23.3, 28.5	8.6	6.5, 10.8	.004	.013		
<i>By ethnicity</i>											
<i>European/other</i>											
2007	4964	69.6	67.2, 72.0	24.6	22.7, 26.5	5.8	5.0, 6.6				
2012	4303	62.2	59.6, 64.9	29.8	27.8, 31.8	8.0	6.9, 9.1				
<i>Māori</i>											
2007	1587	54.8	52.3, 57.4	34.7	32.2, 37.2	10.5	8.6, 12.4				
2012	1593	47.0	44.2, 49.8	38.8	36.2, 41.3	14.3	12.1, 16.4				
<i>Pacific</i>											
2007	832	43.5	38.6, 48.4	40.4	36.0, 44.9	16.1	13.8, 18.4				
2012	1103	32.8	28.6, 36.9	43.3	40.1, 46.5	24.0	21.3, 26.6				
<i>Asian</i>											
2007	1043	71.2	66.6, 75.7	22.2	19.0, 25.4	6.6	4.6, 8.6				
2012	979	66.8	62.2, 71.5	25.0	21.1, 28.9	8.2	6.5, 10.0	.48	.40		
<i>By small area deprivation</i>											
<i>Low deprivation</i>											
2007	3035	74.3	71.6, 77.1	21.4	19.2, 23.6	4.3	3.3, 5.3				
2012	2576	68.4	65.8, 71.0	25.5	23.5, 27.6	6.1	4.9, 7.2				
<i>Middle levels of deprivation</i>											
2007	3191	65.6	62.9, 68.2	27.1	24.9, 29.3	7.3	6.3, 8.4				
2012	2825	56.5	53.4, 59.6	33.2	30.7, 35.6	10.3	8.8, 11.8				
<i>High deprivation</i>											
2007	2083	48.3	45.2, 51.3	38.0	35.5, 40.5	13.7	12.0, 15.5				
2012	2487	41.2	37.3, 45.0	40.4	38.0, 42.8	18.4	15.8, 21.1	.55	.44		
<i>By urbanicity</i>											
<i>Rural</i>											
2007	1327	69.5	66.1, 72.9	24.6	21.9, 27.3	5.9	4.1, 7.7				
2012	1204	63.0	59.0, 66.9	30.3	27.0, 33.7	6.7	5.2, 8.2				
<i>Minor urban</i>											
2007	1148	61.7	58.1, 65.2	30.2	27.0, 33.5	8.1	6.7, 9.4				
2012	880	49.9	45.7, 54.0	37.6	33.1, 42.1	12.5	9.7, 15.3				

(Continued)

**Table 1.** Continued.

	<i>n</i>	Frequency of food security concerns						<i>p</i> -Value <sup>b</sup>	<i>p</i> -Value <sup>c</sup>
		Never		Occasionally, sometimes		Often, always			
		%	95% CI <sup>a</sup>	%	95% CI	%	95% CI		
Main urban									
2007	5836	63.9	59.9, 67.9	28.0	25.2, 30.7	8.2	6.8, 9.6		
2012	5804	55.0	51.0, 58.9	32.7	30.6, 34.9	12.3	10.2, 14.4	0.33	0.49

<sup>a</sup>95% Confidence Interval.

<sup>b</sup>*p*-Value for interaction between year and socio-demographic variable.

<sup>c</sup>*p*-Value for interaction between year and socio-demographic variable, controlling for all other socio-demographic variables.

The ethnic gradient in food security concerns is visually displayed in [Figure 1](#). Though the prevalence of food security concerns increased across all ethnic groups between 2007 and 2012, food security concerns are most frequently experienced by Pacific young people and Māori young people. In 2012, approximately 2 out of 3 Pacific young people and half of Māori young people reported food security concerns occasionally or more often.

In 2012, young people with food security concerns were more likely to report poor indicators of health and wellbeing ([Table 2](#)). Nearly one-third of young people with food security concerns often or always skipped school in the past year, compared with only 18% of students reporting that they never have food security concerns. Young people with the most frequent food security concerns were also less likely to report average or better grades at school and good general health and were more likely to be overweight or obese than young people with no food security concerns. With regard to mental health, nearly 12% of young people with frequent food security concerns had made a suicide attempt in the past year, compared to 2% of students with no food security concerns. Concerns about food security was associated with higher levels of depressive symptoms and lower levels of wellbeing. All relationships were statistically significant ( $p < .05$ ) when controlling for age, sex, ethnicity and area level deprivation.

**Table 2.** Relationship between food insecurity and indicators of wellbeing among New Zealand adolescents, 2012.

	<i>n</i>	Frequency of food security concerns			<i>p</i> -Value <sup>b</sup>
		Never % <sup>a</sup>	Occasionally, sometimes %	Often, always %	
Skipped school, past year	7963	18.1	26.9	32.4	<.001
School results, average or better	7723	94.0	89.7	83.3	<.001
General health, good	7954	94.2	88.9	83.2	<.001
Weight range					
Obese	988	9.2	16.0	19.4	
Overweight	1877	21.6	25.7	29.7	
Healthy weight	4749	65.5	55.8	48.8	
Underweight	245	3.7	2.5	2.0	<.001
Suicide attempt	7840	2.2	6.2	11.5	<.001
	<i>n</i>	Mean <sup>c</sup>	Mean	Mean	<i>p</i> -Value <sup>b</sup>
Depressive symptoms	7715	18.1	20.8	23.2	<.001
Wellbeing	7868	17.0	15.4	14.0	<.001

<sup>a</sup>Percentages are unadjusted.

<sup>b</sup>*p*-Values are adjusted for age, sex, ethnicity and deprivation.

<sup>c</sup>Least squared means, controlling for age, sex, ethnicity and deprivation.

## Discussion

More than 40% of secondary school students in New Zealand reported concerns about food security, and this was significantly higher than 2007. This increase in food insecurity mirrors the more general patterns of child poverty in New Zealand. During the late 1980s, child poverty in New Zealand rose sharply as a consequence of economic reforms that privatised many public services (Dale et al. 2011). Corrective reforms in the early 2000s helped to reduce child poverty somewhat, though the 2008 global financial crisis has countered these improvements (Dale et al. 2011). In addition, between 2007 and 2012, there were few new government initiatives specifically addressing issues of food security or child poverty.

Food security concerns increased across all socio-demographic sub-groups in the population, though the greatest burden of food insecurity is experienced by Māori young people and Pacific young people. The social gradient in food insecurity observed in the current analyses is consistent with previous national studies of adults (University of Otago and Ministry of Health 2011) and children (Ministry of Health 2003). These findings are notable as Māori young people and Pacific young people are over-represented in multiple indicators of poor health and wellbeing in New Zealand (Crengle et al. 2013; Fa'alili-Fidow et al. 2016). In addition, younger students appeared to be more likely to report food insecurity than older students. These findings may reflect that in New Zealand, young people may leave school once they turn 16 and those who leave school experience greater socio-economic hardship.

Findings from the current study suggest that food insecurity is associated with a wide range of indicators of poor health and wellbeing for adolescents. Specifically, adolescents experiencing food security concerns were more likely to be overweight, experience poorer mental health, and were more likely to skip school. Our findings are consistent with the general theory and growing body of evidence that food insecurity negatively affects the healthy development of children and adolescents (Cook and Frank 2008). The relationship between food insecurity and overweight has been previously documented (Larson and Story 2011; Utter et al. 2012), and likely attributable to poor nutrition. Young people experiencing food insecurity have less healthy eating behaviours and perceptions of food than food secure young people (Widome et al. 2009; Utter et al. 2012). Our findings that food insecurity was associated with poor mental health and suicide attempts (Alaimo et al. 2002; Burke et al. 2016; Poole-Di Salvo et al. 2016) and worse educational indicators (Alaimo et al. 2001) is also consistent with previous research. While it is less obvious why food insecurity would affect a young person's mental health or education, it has been hypothesised that family stress may play an important role (Cook and Frank 2008). Poor nutrition may also mediate these findings as numerous studies are beginning to emerge examining the role nutrition plays in adolescent mental health (O'Neil et al. 2014; Kulkarni et al. 2015) and school achievement (Bradley and Greene 2013).

Strengths of the current study lie in its large, nationally representative samples and well-validated measures of mental health and objective measures of overweight. That said, there are a few limitations to the current study that warrant consideration. First, data for the current study were drawn from two populations of young people who attend secondary school. This has implications for interpreting the extent of food insecurity in this population as young people who do not attend mainstream school are at risk for a number

of poor health and social outcomes (Clark et al. 2010). Thus, our estimates of food insecurity in the adolescent population in New Zealand are likely to be underestimated given the backgrounds of young people who are not in school. Second, our measure of food security concerns was only one item. Across multiple studies, there are multiple measures of household food security being used, making it difficult to compare prevalence estimates across populations. Furthermore, to our knowledge, there are no validated measures of household food security for adolescents. However, our measure was consistently used across the two time periods and does provide estimates of food insecurity consistent with the more comprehensive measures used in the national survey of New Zealand adults. Last, both the food security item and the indicators of wellbeing (excluding obesity) were reported by the student. As such, shared method variance may explain some of these findings as students who report aspects of their wellbeing negatively may also report aspects of their home negatively.

The current study highlights the growing concerns of food insecurity reported by adolescents in New Zealand. Interventions that address food security for households with children are tangible and easily administered. In addition, food security interventions may provide additional benefits to promoting the healthy development of children and young people.

## Disclosure statement

No potential conflict of interest was reported by the authors.

## Funding

Funding for the Youth'12 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.

## ORCID

Jennifer Utter  <http://orcid.org/0000-0001-9472-5595>

## References

- Adolescent Health Research Group. 2008. Youth'07: the health and wellbeing of secondary school students in New Zealand. Technical Report. Auckland: University of Auckland.
- Alaimo K, Olson CM, Frongillo EA Jr. 2001. Food insufficiency and American school-aged children's cognitive, academic, and psychosocial development. *Pediatrics*. 108(1):44–53.
- Alaimo K, Olson CM, Frongillo EA. 2002. Family food insufficiency, but not low family income, is positively associated with dysthymia and suicide symptoms in adolescents. *Journal of Nutrition*. 132(4):719–725.
- Atkinson J, Salmond C, Crampton P. 2014. Nzdep2013 index of deprivation. Wellington: University of Otago.
- Bech P, Olsen LR, Kjoller M, Rasmussen NK. 2003. Measuring well-being rather than the absence of distress symptoms: a comparison of the SF-36 mental health subscale and the WHO-five well-being scale. *International Journal of Methods in Psychiatric Research*. 12(2):85–91.

- Bradley BJ, Greene AC. 2013. Do health and education agencies in the United States share responsibility for academic achievement and health? A review of 25 years of evidence about the relationship of adolescents' academic achievement and health behaviors. *Journal of Adolescent Health*. 52(5):523–532.
- Burke MP, Martini LH, Cayir E, Hartline-Grafton HL, Meade RL. 2016. Severity of household food insecurity is positively associated with mental disorders among children and adolescents in the United States. *Journal of Nutrition*. 146(10):2019–2026.
- Carter KN, Lanumata T, Kruse K, Gorton D. 2010. What are the determinants of food insecurity in New Zealand and does this differ for males and females? *Australian and New Zealand Journal of Public Health*. 34(6):602–608.
- Casey PH, Szeto KL, Robbins JM, Stuff JE, Connell C, Gossett JM, Simpson PM. 2005. Child health-related quality of life and household food security. *Arch Pediatrics and Adolescent Medicine*. 159(1):51–56.
- Clark T, Fleming T, Bullen P, Crengle S, Denny S, Dyson B, Peiris-John R, Robinson E, Rossen F, Sheridan J, et al. 2013. Health and well-being of secondary school students in New Zealand: trends between 2001, 2007 and 2012. *Journal of Paediatrics and Child Health*. 49(11):925–934.
- Clark T, Smith J, Raphael D, Jackson C, Fleming T, Denny S, Ameratunga S, Robinson E. 2010. Youth'09: the health and wellbeing of young people in alternative education. A report on the needs of Alternative Education students in Auckland and Northland. Auckland: The University of Auckland.
- Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. 2000. Establishing a standard definition for child overweight and obesity worldwide: international survey. *British Medical Journal*. 320(7244):1240–1240.
- Cole TJ, Lobstein T. 2012. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatric Obesity*. 7(4):284–294.
- Coleman-Jensen A, Rabbitt M, Gregory C, Singh A. 2015. Household food security in the United States in 2014. Economic Research Report Number 194: U.S. Department of Agriculture, Economic Research Service.
- Cook JT, Frank DA. 2008. Food security, poverty, and human development in the United States. *Annals of the New York Academy of Sciences*. 1136:193–209.
- Crengle SCT, Robinson E, Bullen P, Dyson B, Denny S, Fleming T, Fortune S, Peiris-John R, Utter J, Rossen F, et al. 2013. The health and wellbeing of Māori New Zealand secondary school students in 2012. *Te Ara whakapiki taitamariki: Youth'12*. Auckland: University of Auckland.
- Dale M, O'Brien M, St. John S. 2011. Left further behind: how policies fail the poorest children in New Zealand. Auckland: Child Poverty Action Group.
- Denny S, Lewycka S, Utter J, Fleming T, Peiris-John R, Sheridan J, Rossen F, Wynd D, Teevale T, Bullen P, Clark T, et al. 2016. The association between socioeconomic deprivation and secondary school students' health: findings from a latent class analysis of a national adolescent health survey. *International Journal for Equity in Health*. 15(1):757.
- Drewnowski A, Specter SE. 2004. Poverty and obesity: the role of energy density and energy costs. *American Journal of Clinical Nutrition*. 79(1):6–16.
- Fa'alili-Fidow JME, Denny S, Dixon R, Teevale T, Ikihele A, Adolescent Health Research Group, Clark TC. 2016. The health and wellbeing of secondary school students in New Zealand: results for pacific young people. Auckland: University of Auckland.
- Fram MS, Ritchie LD, Rosen N, Frongillo EA. 2015. Child experience of food insecurity is associated with child diet and physical activity. *Journal of Nutrition*. 145(3):499–504.
- Kulkarni AA, Swinburn BA, Utter J. 2015. Associations between diet quality and mental health in socially disadvantaged New Zealand adolescents. *European Journal of Clinical Nutrition*. 69(1):79–83.
- Larson NI, Story MT. 2011. Food insecurity and weight status among U.S. children and families: a review of the literature. *American Journal of Preventive Medicine*. 40(2):166–173.
- Milfont TL, Merry S, Robinson E, Denny S, Crengle S, Ameratunga S. 2008. Evaluating the short form of the Reynolds adolescent depression scale in New Zealand adolescents. *Australian New Zealand Journal of Psychiatry*. 42(11):950–954.

- Ministry of Health. 2003. Nz food NZ children: key results of the 2002 national children's nutrition survey. Wellington: Ministry of Health.
- O'Neil A, Quirk SE, Housden S, Brennan SL, Williams LJ, Pasco JA, Berk M, Jacka FN. 2014. Relationship between diet and mental health in children and adolescents: a systematic review. *American Journal of Public Health*. 104(10):e31–42.
- Poole-Di Salvo E, Silver EJ, Stein RE. 2016. Household food insecurity and mental health problems among adolescents: what do parents report? *Academic Pediatrics*. 16(1):90–96.
- Reynolds W, editor. 2004. *The Reynolds adolescent depression scale-second edition (RADS-2)*. Hoboken, NJ: John Wiley & Sons.
- Shtasel-Gottlieb Z, Palakshappa D, Yang F, Goodman E. 2015. The relationship between developmental assets and food security in adolescents from a low-income community. *Journal of Adolescent Health*. 56(2):215–222.
- Statistics New Zealand. 2005. *Statistical standard for ethnicity*. Wellington: Statistics New Zealand.
- Taylor A, Loopstra R. 2016. *Too poor to eat. Food insecurity in the UK*: Ford Foundation.
- University of Otago and Ministry of Health. 2011. *A focus on nutrition: key findings of the 2008/09 New Zealand adult nutrition survey*. Wellington: Ministry of Health.
- Utter J, Denny S, Robinson E, Teevale T, Crengle S, Ameratunga S, Fleming T. 2012. Food security concerns among young people: Impact on eating behaviors and weight status. *Journal of Hunger and Environmental Nutrition*. 7:101–111.
- Widome R, Neumark-Sztainer D, Hannan PJ, Haines J, Story M. 2009. Eating when there is not enough to eat: eating behaviors and perceptions of food among food-insecure youths. *American Journal of Public Health*. 99(5):822–828.