

# What are the determinants of food insecurity in New Zealand and does this differ for males and females?

## Abstract

**Aims:** Food insecurity is a lack of assured access to sufficient nutritious food. We aimed to investigate the demographic and socio-economic determinants of food insecurity in New Zealand and whether these determinants vary between males and females.

**Methods:** We used data from the longitudinal Survey of Families, Income and Employment (SoFIE) (n=18,950). Respondents were classified as food insecure if, in the past 12 months, they had to use special food grants or food banks, been forced to buy cheaper food to pay for other things, or had to go without fresh fruit and vegetables often. Logistic regression analyses were used to investigate the association of demographic and socio-economic factors on food insecurity. Models were repeated stratifying by males and females.

**Results:** Over 15% of the SoFIE population in NZ were food insecure in 2004/05. The prevalence of food insecurity was much greater in females (19%) than males (12%). The adjusted odds of food insecurity was significantly higher in females compared to males (OR 1.6, 95% CI 1.5-1.8). In univariate analyses, food insecurity was associated with sole parenthood, unmarried status, younger age groups, Māori and Pacific ethnicity, worse self-rated health status, renting, being unemployed and lower socioeconomic status. Income was the strongest predictor of food insecurity in multivariate modelling (OR 4.9, 95%CI 4.0-5.9 for lowest household income quintile versus highest). The associations of demographic and socioeconomic factors with food insecurity were similar in males and females.

**Conclusions:** Food insecurity is a timely and relevant issue, as it affects a significant number of New Zealanders. Targeted policy interventions aimed at increasing money available in households are needed.

**Key words:** Food security; determinants; gender; socioeconomic status

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**B**asic necessities such as adequate food, clothing and housing are fundamental to wellbeing.<sup>1</sup> Concern is growing in developed countries that certain groups in society do not have access to the food needed for a healthy life.<sup>2-10</sup> Food security is defined as the assured ability to acquire nutritionally adequate and safe food that meets cultural needs, and has been acquired in a socially acceptable way.<sup>4,11</sup> Conversely, food insecurity exists largely as a consequence of limited resources, a problem affecting many households worldwide and in New Zealand.<sup>3,4,6,7,12,13</sup> An emerging body of literature linking food insecurity to a range of negative health outcomes has highlighted the importance of food security as an indicator of wellbeing and validated the growing public concern on this issue.<sup>1,3,13,14</sup> Food insecurity has been linked to outcomes such as a nutritionally inadequate diet,<sup>15</sup> iron deficiency anaemia,<sup>16</sup> multiple chronic conditions, obesity,<sup>17,18</sup> and poor self-rated physical and mental health.<sup>6,8</sup>

Income has been established as one of the most important determinants of food security.<sup>19</sup> US studies such as the Current Population Survey (CPS) and the Third

National Health and Nutrition Examination Survey have demonstrated a negative relationship between income and food insecurity, such that lower income groups experience increasingly higher rates of food insecurity.<sup>3,12,19,20</sup> Despite this relationship, however, food insecurity is not exclusive to low-income groups and is prevalent to some extent in higher income households. A Canadian survey has shown that 14% of middle-income households experienced food insecurity, compared to 34% of low-income households.<sup>17</sup> Food insecure households are more likely to suffer from loss of income or variation in income, with a lack of savings from which to cover the shortfall.<sup>21</sup> There are a number of other socioeconomic factors that are associated with food insecurity, such as neighbourhood (area) deprivation,<sup>5</sup> dependence on government income subsidies and being a rental tenant in Canada,<sup>7</sup> as well as receipt of food stamp benefits and unemployment in the US.<sup>12,19</sup>

The socio-demographic determinants of food security are also well documented in the international literature. The prevalence

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of food insecurity is consistently found to be higher in females than males.<sup>4,7,10,12,20</sup> In the US, households at a higher risk of food insecurity include those with children, those headed by a single parent or headed by a female, Hispanic and black households, and those located within central cities.<sup>3,12</sup> Aboriginal ethnicity in Canada has been shown to be strongly related to food insecurity.<sup>7</sup> Conversely, certain factors have been found to be protective of food insecurity, such as households that are white non-Hispanic, elderly, headed by a married couple, or comprising multiple adults without children.<sup>12</sup>

More specific data relating to the prevalence and determinants of food security in New Zealand is available from the adult and child National Nutrition Surveys.<sup>4,5,22</sup> Food security is a concern for about 20% of New Zealand households.<sup>22</sup> Females are more likely than their male counterparts to report that they can afford to eat properly only sometimes in the past year or that food runs out because of lack of money.<sup>4,5</sup> New Zealanders living in highly deprived areas (NZ Deprivation quintiles 4 and 5: 11% and 20%) were more food insecure and more likely to use special food grants or food banks because of lack of money compared to those in less deprived neighbourhoods. Additionally, households with seven or more members were less likely to say they could always afford to eat properly than those with less than seven members.<sup>22</sup>

Another major determinant of food security in New Zealand is ethnicity. Prevalence rates vary considerably between Māori, Pacific, and European and other ethnic descent (NZEO) groups. Māori and Pacific people were less likely to report that they could always afford to eat properly compared to NZEO households (64%, 47%, and 86% respectively).<sup>4,5</sup> Likewise, Māori and Pacific households were more likely than NZEO to limit the variety of food they were able to eat (45%, 60% and 28% respectively). Several reports have highlighted the issues of food security in these ethnic populations and documented a number of community initiatives to address the problem in these groups.<sup>11,23,24</sup> A recent report, "Enhancing food security and physical activity: the views of Māori, Pacific and low income peoples", suggested that income and cost of healthy food are two of the most pressing issues in relation to food security for these communities in New Zealand.<sup>25</sup>

There has been little research that has investigated the socioeconomic determinants of food security in New Zealand. This information is crucial for service planning and interventions for groups at risk, and addressing the issue may help to reduce health inequalities. This paper investigates the demographic and socioeconomic determinants of food security in New Zealand and whether these determinants vary between males and females.

## Methods

### Data

This study is a cross-sectional analysis utilising data from the Survey of Families, Income and Employment (SoFIE) conducted in New Zealand from 2002-2010 (SoFIE data Wave 1 to 4 Version 6).<sup>26</sup> Briefly, SoFIE is a nationally representative fixed household panel longitudinal survey of the usually resident population living in private dwellings. In SoFIE, face to face interviews are used to collect annual information on income levels, sources and changes; and on the major influences on income such as employment and education experiences,

household and family status and changes, demographic factors, and health status. The initial SoFIE sample comprised approximately 11,500 responding private households (response rate of 77%) with over 22,000 adults responding in Wave 1, reducing to just over 20,000 in Wave 2 (91%) and nearly 19,000 adults in Wave 3 (85% of Wave 1 responders).

The current analysis was restricted to original sample members who responded in Wave 3 (2004/05: including the health module), aged 15 years or older (n = 18,950).

## Measures

### Food security

The measure of food security used in this paper was adapted from three questions in the New Zealand Index of Individual Deprivation (NZiDep) which were asked at the Wave 3 interview. The NZiDep is a tool used for measuring socioeconomic position for individuals and is based on eight simple questions which take about two minutes to administer,<sup>27</sup> including three questions on food insecurity:

- In the past 12 months have you personally made use of special food grants or food banks because you did not have enough money for food? (yes/no)
- In the past 12 months have you personally been forced to buy cheaper food so that you could pay for other things you needed? (yes/no)
- In the past 12 months have you personally gone without fresh fruit and vegetables often so that you could pay for other things you needed? (yes/no)

If someone answered yes to any of these three questions, we classified them as food insecure.

### Demographic and socioeconomic variables

Demographic confounders were taken from the Wave 3 interview: age, sex, prioritised ethnicity, legal marital status (never legally married, divorced/separated/widowed, and legally married), family circumstance (couple only, couple with children, sole parent, not in a family nucleus) and household composition (one family, two or more families, single person and other multi-person household).

Socioeconomic confounders were taken from the Wave 3 interview and considered as confounders in the current analyses. Household income was derived by totalling adult annual personal income (before tax) from all sources received, Consumer Price Index adjusted, equivalised for household economies of scale using a New Zealand-specific Jensen Index,<sup>28</sup> and categorised into quintiles. Labour force involvement was defined as being either employed, not employed but seeking work, or not employed and not seeking work, at the time of the interview. The highest level of education was coded as nil, school, post-school vocational, or degree or higher qualification. The New Zealand Deprivation (NZDep2001) index provides a neighbourhood-level deprivation score.<sup>29</sup>

## Statistical analysis

All analyses were conducted using SAS 8.2 within the Statistics New Zealand data lab, Wellington. Cross-tabulations of food insecurity and demographic and socioeconomic variables were

used to investigate the relationship of these measures on food security. These tables were also divided by males and females. Logistic regression analyses were used to build a model of food insecurity. The final full model included the demographic and socioeconomic confounders that had a significant impact on food security. The final models were repeated stratifying by sex to investigate differences in the impact of various measures on food security in males and females.

## Results

More than 15% of the SoFIE population were categorised as food insecure in 2004/05. The prevalence of food insecurity was much greater in females (19%) than males (12%). Table 1 shows the breakdown of the three questions that were used to develop the overall measure of food insecurity. Over 95% of food insecure respondents reported that they had been forced to buy cheaper food in order to pay for other things in the past 12 months. Around 15% of food insecure respondents reported that they had gone without fresh fruit and vegetables often in the last 12 months, and 22% had used food grants or food banks in the past 12 months.

Table 2 shows the distribution of food insecurity across common demographic and socioeconomic characteristics in the overall population and for males and females. There were higher proportions of food insecure respondents in people who were younger- to middle-aged (25-44 years), legally unmarried, and of Māori or Pacific ethnicity. Additionally, respondents who lived in a sole parent family were much more likely to be food insecure. Food insecurity was strongly associated with being unemployed and actively looking for work as well as receiving some form of means tested government benefit in the past 12 months. There was an inverse linear relationship with increased proportions of respondents reporting food insecurity at lower levels of measures of socioeconomic status. Respondents who lived in highly deprived areas (NZDep deciles 7-10), those in lower household income and wealth quintiles, and those living in rented accommodation were more likely to be food insecure. Food insecure respondents were also more likely to rate their health worse than people who were food secure.

**Table 1: Table of food insecurity by males and females, broken down by the three questions used to create the measure of food insecurity.**

	Total		Male		Female	
	n	%	n	%	n	%
Food insecure	3,000	15.8	1,020	11.7	1,980	19.4
Often no fruit and vegetables						
No	2,555	85.2	885	86.8	1,670	84.3
Yes	445	14.8	135	13.2	310	15.7
Buy cheaper food						
No	145	4.8	60	5.9	90	4.5
Yes	2,855	95.2	960	94.1	1,890	95.5
Used food banks food grants						
No	2,355	78.5	825	80.9	1,530	77.3
Yes	645	21.5	195	19.1	450	22.7

Note: The numbers of respondents are random rounded to the nearest multiple of five, with a minimum value of 10, as per Statistics New Zealand confidentiality protocol.

The findings were typically stronger in females compared to males. Over 44% of female sole parents were food insecure compared to 19% of male sole parents. Females who were unemployed, had received some form of income benefit in the past 12 months, were living in more deprived areas, or in the lower income quintiles were much more likely to be food insecure compared to their male counterparts.

Table 3 presents the results from logistic regression, crude and multivariate odds ratios of food security for key demographic and socioeconomic variables in the total population and by males and females. Females had much higher odds of reporting food insecurity than males (adjusted OR 1.6, 95%CI 1.5-1.8). Most of the odds were reduced when all variables were mutually adjusted for in the models. The association of food insecurity with Pacific ethnicity and unmarried status was lost in adjusted analyses. The socioeconomic variables, labour market activity, NZ Deprivation index, household income, wealth and dwelling tenure remained strongly associated with food insecurity in the adjusted models. Household income had the strongest association with food insecurity (OR 4.9, 95%CI 4.0-5.9, lowest income quintile versus highest). The associations of demographic and socioeconomic factors with food insecurity were similar in males and females. However, the odds of food insecurity in sole parenthood, compared to living as a couple, remained highly significant in the multivariate model in females. Also, wealth had a stronger multivariate association of the odds of food insecurity in males compared to females.

## Discussion

Results from the analyses of the SoFIE data showed that over 15% of the SoFIE population in New Zealand were food insecure in 2004/05. Food insecurity was associated with sole parenthood, unmarried status, younger age groups, Māori and Pacific ethnicity, and lower socioeconomic status. Food insecure respondents also tended to rate their health worse than those who were food secure. Income was the strongest predictor of food insecurity in multivariate modelling.

The prevalence of food insecurity was found to be much higher in females (19%) compared to males (12%). This is consistent with previous research.<sup>3,4,7,20</sup> However, to date, there has been little research that has investigated multivariate gender differences in food security.

Several theories may explain the higher prevalence of food insecurity in females. Females tend to have different social roles from men, which are more focused on feeding and caring for their families.<sup>18</sup> Women may compromise their food intake to feed their children or husbands when the family is threatened by food insecurity.<sup>13</sup> In addition, women are more likely to be sole parents than men. In New Zealand, around 80% of sole parents are female.<sup>30</sup> In the US, prevalence of food insecure households with children headed by a single woman was much higher (31%), compared to 18% of similar households headed by a single man.<sup>3,12</sup> This is similar to the current study, where the odds of food insecurity in sole parenthood, compared to living in a couple, remained highly significant in the multivariate model in females.

**Table 2: The prevalence of food insecurity across key demographic and socioeconomic variables.<sup>a</sup>**

	Total <sup>b</sup>			Male			Female		
	N	n	%	N	n	%	N	n	%
All	18,955	3,000	15.8	8,740	1,020	11.7	10,215	1,980	19.4
Age									
15-24	2,930	475	16.2	1,425	185	13.0	1,510	290	19.2
25-34	2,680	660	24.6	1,170	190	16.2	1,510	470	31.1
35-44	3,790	830	21.9	1,705	265	15.5	2,085	565	27.1
45-54	3,525	525	14.9	1,645	190	11.6	1,880	335	17.8
55-64	2,795	305	10.9	1,330	110	8.3	1,465	200	13.7
65+	3,235	200	6.2	1,465	80	5.5	1,765	120	6.8
Marital status									
Never married	5,775	1,200	20.8	2,815	435	15.5	2,960	765	25.8
Divorced widowed separated	3,325	740	22.3	1,070	165	15.4	2,255	575	25.5
Married	9,835	1,055	10.7	4,850	420	8.7	4,990	635	12.7
Prioritised ethnicity									
NZ/European	14,720	1,980	13.5	6,880	680	9.9	7,840	1,305	16.6
Māori	2,075	605	29.2	875	190	21.7	1,200	410	34.2
Pacific	860	240	27.9	375	80	21.3	485	160	33.0
Asian	975	105	10.8	450	40	8.9	525	60	11.4
Other	325	70	21.5	160	30	18.8	170	40	23.5
Family status									
Couple only	5,400	380	7.0	2,675	160	6.0	2,725	220	8.1
Couple with children	7,665	1,150	15.0	3,805	440	11.6	3,860	710	18.4
Sole parent	1,840	685	37.2	505	95	18.8	1,330	590	44.4
Not in a family nucleus	4,045	785	19.4	1,750	325	18.6	2,295	460	20.0
Household composition									
One family	14,575	2,135	14.6	6,850	675	9.9	7,730	1,460	18.9
Two or more families	610	140	23.0	255	45	17.6	355	90	25.4
Other multi-person household	1,030	230	22.3	515	105	20.4	520	125	24.0
One person household	2,730	495	18.1	1,120	195	17.4	1,610	300	18.6
Maximum education qualification									
No qualification	4,730	860	18.2	2,080	305	14.7	2,650	555	20.9
School qualification	5,075	780	15.4	2,135	245	11.5	2,940	540	18.4
Post school	6,460	1,050	16.3	3,270	380	11.6	3,190	670	21.0
Degree	2,680	305	11.4	1,250	90	7.2	1,430	215	15.0
Labour market activity									
Working	12,330	1,720	13.9	6,255	640	10.2	6,075	1,075	17.7
Not employed, looking	355	140	39.4	185	55	29.7	170	85	50.0
Not employed, not looking	6,250	1,140	18.2	2,290	325	14.2	3,955	815	20.6
Received an income means-tested benefit, in the last 12 months									
No	16,945	2,025	12.0	8,140	780	9.6	8,805	1,245	14.1
Yes	2,010	975	48.5	600	240	40.0	1,410	730	51.8
NZ Deprivation									
NZDepQ1 (least)	3,845	280	7.3	1,855	95	5.1	1,985	185	9.3
NZDepQ2	3,835	390	10.2	1,795	145	8.1	2,040	245	12.0
NZDepQ3	3,490	580	16.6	1,605	180	11.2	1,885	395	21.0
NZDepQ4	4,055	755	18.6	1,855	260	14.0	2,200	495	22.5
NZDepQ5 (most)	3,720	1,000	26.9	1,625	340	20.9	2,095	660	31.5
Household income									
Q1	2,225	715	32.1	905	230	25.4	1,315	485	36.9
Q2	4,410	1,000	22.7	1,790	315	17.6	2,615	685	26.2
Q3	3,660	650	17.8	1,680	230	13.7	1,980	420	21.2
Q4	4,055	410	10.1	2,040	155	7.6	2,015	255	12.7
Q5	4,605	225	4.9	2,320	90	3.9	2,285	135	5.9
Wealth									
Q1	3,080	750	24.4	1,460	295	20.2	1,620	455	28.1
Q27	3,300	885	26.8	1,495	295	19.7	1,810	585	32.3
Q3	3,825	705	18.4	1,750	230	13.1	2,075	475	22.9

**Table 2: The prevalence of food insecurity across key demographic and socioeconomic variables.<sup>a</sup>**

	Total <sup>b</sup>			Male			Female		
	n	Food Insecure n	%	n	Food Insecure n	%	n	Food Insecure n	%
Wealth									
Q4	4,025	370	9.2	1,825	110	6.0	2,200	255	11.6
Q5	4,030	175	4.3	1,890	45	2.4	2,140	130	6.1
Dwelling tenure									
Owned	13,950	1,475	10.6	6,550	505	7.7	7,410	975	13.2
Rented	4,620	1,525	33.0	2,015	515	25.6	2,600	1,005	38.7
Self rated health									
Excellent	6,355	700	11.0	2,975	235	7.9	3,375	465	13.8
Very Good	6,440	935	14.5	2,955	290	9.8	3,485	645	18.5
Good	4,235	845	20.0	1,955	300	15.3	2,280	545	23.9
Fair	1,475	380	25.8	650	150	23.1	820	230	28.0
Poor	445	140	31.5	205	50	24.4	240	90	37.5

Notes: a) The numbers of respondents are random rounded to the nearest multiple of five, with a minimum value of 10, as per Statistics New Zealand confidentiality protocol.

b) Numbers may not sum to the total due to missing values and random rounding

Food security is strongly related to current disposable income.<sup>3,7,19</sup> We found a strong inverse linear relationship between income and food insecurity with four-times the odds of being food insecure in the lowest income quintile compared to the highest. There were also more females than males in the lower income groups. Low income households have been found to rely on welfare payments, food banks and food vouchers in order to purchase food.<sup>3,7,30</sup> Additionally, research has shown low income households end up in debt partly due to having inadequate income to meet their household expenses.<sup>31</sup> In particular, Pacific peoples are at risk of being trapped in the debt cycle and living in poverty from being targeted by fringe lenders.<sup>32</sup>

While income measures current access to money, wealth is the accumulation of economic resources over time. The results of this study showed that income had a stronger association with food insecurity than wealth. For wealth to positively impact on food insecurity, it must be accessible or able to be borrowed against in order to smooth out any variations in income.<sup>21</sup> The unexpected finding, however, was that the strength of the association of wealth with food insecurity in males was double that found in females. This difference may be due to the unequal distribution of wealth in males and females. Males tend to be able to accumulate more wealth than females.<sup>33</sup>

Our study also found that food insecurity was higher among Māori and Pacific people, which is consistent with other New Zealand research.<sup>4,5,22</sup> There are a number of explanations for the higher rates of food insecurity in Māori and Pacific populations. Māori and Pacific have higher rates of poverty than the general population and they suffer disproportionately from the burden of nutrition-related disease.<sup>34</sup> Furthermore, Māori and Pacific households have specific cultural obligations to extended family/whānau that places extra demand on income and they tend to have larger households.<sup>35</sup> However, in the multivariate modelling the risk of food security was reduced to borderline significance in Māori and non-significant in Pacific populations. This indicates that the relationship between ethnicity and food security is partly explained by socioeconomic factors such as income.

This study has various strengths and limitations. The main strength

of this analysis is that it was conducted on a large population-based sample, representative of New Zealand and the overall findings are substantiated by a large body of evidence in the international literature.

The measure of food insecurity was developed from three questions used in an index of individual deprivation (NZiDep). Our measure of food insecurity is based on the concept that refers to the social and economic problem of lack of food due to economic deprivation and it does not tap into facets of hunger.<sup>7</sup> Therefore, it is broader and less extreme than other measures of food insecurity or food insufficiency used in other research.<sup>8,12,14,20</sup> Furthermore, other international studies measuring food security have typically used the US Department of Agriculture's 18-question food security scale or a 6-question subset of that scale.<sup>36</sup> This may make comparison across studies difficult. However, using this composite we have captured a broad population that is experiencing hardship in acquiring adequate nutritious food. The main limitation is that our measure of food insecurity was not based on a standardised measure. However, they were taken from a standardised index of individual deprivation for New Zealand.<sup>27</sup>

Other measures of food security that have been used in New Zealand show similar relationships across demographic variables.<sup>4,5,22</sup> Of the eight items in the New Zealand National Nutrition Surveys, the item that has most overlap with the questions in NZiDep is that related to use of food banks. For comparison, in 2002 10% of households with children responded that they sometimes or often had to rely on food banks or food grants over the past year.<sup>22</sup> In the 1996/97 Nutrition Survey 4% of households had used food banks.<sup>5</sup> In our population, using a similar question as part of the NZiDep, only 3% reported using a food bank or food grant in the past 12 months. The difference in the proportions using food banks across the three surveys may be related to survey sample populations where the 2002 Children's Nutrition Survey was conducted on households including children only. It has previously been shown that households with children are more likely to use food banks. Therefore, our current population-based survey results may be an undercount of food insecurity in New Zealand.

Given the current economic climate, food insecurity is a timely

**Table 3: Logistic Regression univariate and multivariable (fully adjusted) odds ratios (95% confidence interval) of food insecurity in the total population and by males and females.**

	Total		Males		Females	
	Univariate	Multivariable	Univariate	Multivariable	Univariate	Multivariable
<b>Sex</b>						
Male	1	1				
Female	1.8 (1.7-2.0)	1.6 (1.5-1.8)				
<b>Age</b>						
15-24	1	1	1	1	1	1
25-34	1.6 (1.4-1.9)	2.0 (1.7-2.4)	1.2 (1.0-1.5)	1.7 (1.3-2.2)	1.8 (1.5-2.2)	2.2 (1.7-2.8)
35-44	1.4 (1.2-1.6)	2.3 (1.9-2.7)	1.2 (1.0-1.5)	2.1 (1.6-2.9)	1.5 (1.3-1.8)	2.3 (1.8-2.9)
45-54	0.8 (0.7-1.0)	1.8 (1.4-2.2)	0.8 (0.7-1.1)	1.9 (1.3-2.6)	0.8 (0.7-1.0)	1.7 (1.3-2.2)
55-64	0.6 (0.5-0.7)	1.1 (0.9-1.4)	0.6 (0.4-0.7)	1.3 (0.9-1.8)	0.6 (0.5-0.8)	1.0 (0.8-1.4)
65+	0.3 (0.3-0.4)	0.3 (0.3-0.4)	0.4 (0.3-0.5)	0.4 (0.3-0.6)	0.3 (0.2-0.4)	0.2 (0.2-0.4)
<b>Prioritised ethnicity</b>						
NZ European/other	1	1	1	1	1	1
Māori	2.8 (2.5-3.1)	1.2 (1.1-1.4)	2.6 (2.2-3.2)	1.4 (1.1-1.7)	2.8 (2.5-3.3)	1.2 (1.0-1.4)
Pacific	2.8 (2.4-3.3)	1.0 (0.8-1.2)	2.9 (2.2-3.8)	1.1 (0.8-1.5)	2.7 (2.2-3.4)	1.0 (0.8-1.3)
Asian	0.8 (0.6-1.0)	0.4 (0.3-0.5)	1.0 (0.7-1.4)	0.5 (0.4-0.8)	0.7 (0.5-0.9)	0.3 (0.3-0.5)
<b>Marital dtatus</b>						
Never married	2.4 (2.1-2.6)	1.0 (0.9-1.2)	2.0 (1.8-2.4)	0.9 (0.7-1.2)	2.6 (2.3-2.9)	1.1 (0.9-1.3)
Divorced/widowed	2.4 (2.2-2.7)	1.4 (1.2-1.6)	1.9 (1.6-2.4)	1.1 (0.8-1.4)	2.4 (2.1-2.7)	1.5 (1.3-1.9)
Married	1	1	1	1	1	1
<b>Family composition</b>						
Couple only	1	1	1	1	1	1
Couple with children	2.4 (2.1-2.7)	1.3 (1.1-1.5)	2.1 (1.8-2.6)	1.3 (1.0-1.6)	2.6 (2.2-3.1)	1.4 (1.1-1.7)
Sole parent	8.5 (7.3-9.9)	2.1 (1.7-2.5)	3.8 (2.8-5.1)	1.3 (0.9-1.9)	9.8 (8.2-11.8)	2.3 (1.8-3.0)
Not in a family	3.3 (2.9-3.7)	1.7 (1.4-2.1)	3.7 (3.0-4.6)	1.9 (1.5-2.5)	2.9 (2.4-3.5)	1.7 (1.3-2.1)
<b>Maximum education qualification</b>						
Degree	1	1	1	1	1	1
School qualification	1.5 (1.3-1.7)	1.0 (0.8-1.1)	1.8 (1.4-2.3)	1.1 (0.8-1.4)	1.3 (1.1-1.5)	0.9 (0.8-1.1)
Post school vocational	1.6 (1.3-1.8)	1.1 (1.0-1.3)	1.7 (1.3-2.2)	1.3 (1.0-1.7)	1.5 (1.3-1.8)	1.1 (0.9-1.3)
No qualification	1.9 (1.7-2.2)	1.0 (0.8-1.1)	2.5 (1.9-3.3)	1.1 (0.8-1.4)	1.6 (1.3-1.9)	1.0 (0.8-1.2)
<b>Labour market activity</b>						
Working	1	1	1	1	1	1
Not employed, looking	4.7 (3.7-5.9)	2.3 (1.7-3.0)	4.1 (2.9-5.8)	1.7 (1.2-2.5)	5.7 (4.1-7.9)	3.2 (2.1-4.7)
Not employed, not looking	1.4 (1.3-1.6)	1.3 (1.2-1.5)	1.4 (1.2-1.7)	1.4 (1.2-1.8)	1.3 (1.1-1.4)	1.3 (1.1-1.5)
<b>NZ Deprivation</b>						
NZDepQ1	1	1	1	1	1	1
NZDepQ2	1.5 (1.3-1.8)	1.2 (1.0-1.4)	1.6 (1.2-2.1)	1.3 (1.0-1.8)	1.4 (1.2-1.8)	1.1 (0.9-1.4)
NZDepQ3	2.7 (2.3-3.1)	1.7 (1.4-2.0)	2.5 (1.9-3.2)	1.5 (1.1-2.0)	2.7 (2.2-3.3)	1.8 (1.5-2.2)
NZDepQ4	3.1 (2.7-3.6)	1.6 (1.3-1.8)	3.2 (2.5-4.1)	1.5 (1.1-2.0)	3.0 (2.5-3.6)	1.6 (1.3-1.9)
NZDepQ5	5.0 (4.3-5.8)	1.6 (1.3-1.9)	5.3 (4.1-6.8)	1.6 (1.2-2.2)	4.8 (4.0-5.8)	1.5 (1.2-1.9)
<b>Household income</b>						
Q1	10.3 (8.7-12.2)	4.9 (4.0-5.9)	9.8 (7.4-13.0)	4.6 (3.4-6.3)	10.1 (8.1-12.5)	4.9 (3.8-6.2)
Q2	6.0 (5.2-7.1)	4.3 (3.6-5.1)	6.0 (4.6-7.7)	4.2 (3.1-5.5)	5.8 (4.7-7.0)	4.3 (3.4-5.4)
Q3	4.4 (3.7-5.2)	2.8 (2.3-3.3)	4.2 (3.2-5.5)	2.7 (2.0-3.5)	4.4 (3.6-5.5)	2.8 (2.2-3.5)
Q4	2.2 (1.9-2.6)	1.7 (1.4-2.0)	2.2 (1.7-2.9)	1.6 (1.2-2.2)	2.2 (1.8-2.8)	1.7 (1.4-2.2)
Q5	1	1	1	1	1	1
<b>Wealth</b>						
Q1	7.7 (6.4-9.2)	2.8 (2.2-3.5)	11.0 (7.9-15.3)	4.4 (3.0-6.5)	6.6 (5.3-8.2)	2.2 (1.6-2.9)
Q2	8.6 (7.2-10.2)	2.8 (2.3-3.5)	10.6 (7.6-14.7)	4.1 (2.8-5.9)	8.0 (6.5-9.9)	2.4 (1.8-3.0)
Q3	5.1 (4.3-6.1)	2.6 (2.2-3.2)	6.4 (4.6-8.9)	3.6 (2.5-5.1)	4.7 (3.8-5.8)	2.3 (1.8-2.9)
Q4	2.2 (1.8-2.7)	1.7 (1.4-2.0)	2.7 (1.9-3.8)	2.1 (1.4-3.0)	2.0 (1.6-2.5)	1.5 (1.2-1.9)
Q5	1	1	1	1	1	1
<b>Dwelling tenure</b>						
Owned	1	1	1	1	1	1
Rented	4.3 (4.0-4.7)	1.81 (1.6-2.0)	4.3 (3.8-5.0)	1.9 (1.5-2.2)	4.3 (3.9-4.8)	1.7 (1.5-2.0)
<b>Self-rated health</b>						
Excellent/Very good/Good	1	1	1	1	1	1
Fair/Poor	2.2 (1.9-2.4)	2.1 (1.8-2.4)	2.5 (2.1-3.0)	2.0 (1.6-2.5)	2.0 (1.7-2.3)	2.0 (1.7-2.5)

and relevant issue. The number of households experiencing food insecurity, receiving government benefits, or using food banks is likely to increase further over the next few years. Food insecurity and poverty are largely structural factors, therefore improvements need to be made to the economic and political system.<sup>30</sup> A number of policy recommendations have recently been suggested to improve food security for low-income households in New Zealand.<sup>25</sup> These recommendations include increasing money available in households by introducing a food voucher or Smart Card system for low income groups, ensuring beneficiaries are receiving their full and correct benefit entitlements, regulating and improving access to affordable credit institutions, and exploring the provision of food in schools. In addition, food purchasing behaviours can be influenced by enhancing cooking skills and improving access to healthy foods through initiatives such as community markets and vegetable gardens. Other initiatives include working with the food industry to reduce the cost of and promote healthy food options.

Although the SoFIE-Health Study is longitudinal, our analysis is of one wave of data only and therefore is cross-sectional. Once additional waves of SoFIE-Health data are available, we will investigate in more depth the causal pathways leading to food insecurity. We will use longitudinal modelling techniques to identify which factors, such as changes in employment status, income, wealth or health status (e.g. hospitalisation or cancer registration), lead to food insecurity. This will provide evidence for targeted policy interventions.

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## Statistics New Zealand security statement

Access to the data used in this study was provided by Statistics New Zealand in a secure environment designed to give effect to the confidentiality provisions of the Statistics Act, 1975. The results in this study and any errors contained therein are those of the author, not Statistics New Zealand.

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