

Deakin Research Online

Deakin University's institutional research repository

This is the author's final peer reviewed version of the item published as:

Ball, Kylie, Mishra, G. and Crawford, David 2002, Which aspects of socioeconomic status are related to obesity among men and women?, *International journal of obesity*, vol. 26, no. 4, pp. 559-565.

Copyright : 2002, Nature Publishing Group

Which aspects of socioeconomic status are related to obesity among men and women?

Kylie Ball*¹, Gita Mishra², David Crawford¹

¹ School of Health Sciences, Deakin University, Burwood, Victoria 3125 Australia

² Research Institute for Gender and Health, University of Newcastle, Callaghan, New South Wales 2308 Australia

RUNNING HEAD: Socioeconomic status and obesity

*Correspondence: Dr Kylie Ball
School of Health Sciences
Deakin University
221 Burwood Highway
Burwood VIC 3125
AUSTRALIA
Telephone: +61-3-9251-7310
Facsimile: +61-3-9244-6017
Email: kball@deakin.edu.au

Abstract

Objective: This study aimed to investigate the relationships between body weight and fat distribution, and four empirically-derived domains of socioeconomic status: employment, housing, migration status, and family unit. **Design:** A population-based study was used. **Participants:** A total of 8,667 randomly-selected adults (4,167 men; 4,500 women) who participated in the 1995 Australian National Health and Nutrition Surveys provided data on a range of health factors including objective height, weight and body fat distribution, and a range of sociodemographic indicators. **Results:** Results demonstrated associations for women, after controlling for age, between the employment domain, and body mass index and waist-to-hip ratio. Low status employed women were 1.4 times as likely to be overweight as high status employed women. There were less consistent relationships observed among these factors for men. Relationships between family unit and indicators of body weight and body fat distribution were observed for both men and women, with those who were married, particularly men (OR=1.6, 95% CI 1.4-2.0), at higher risk of overweight. The migration and housing socioeconomic status domains were not consistently associated with body mass index or waist-to-hip ratio. **Conclusions:** These findings indicate that different components of socioeconomic status may be important in predicting obesity, and thus should be examined separately. Future research would benefit from investigating the underlying mechanisms governing the relationships between socioeconomic status domains further, particularly those related to employment and family unit, and obesity.

20

Keywords: Socioeconomic status, Body Mass Index, National Nutrition Survey

Introduction

A large number of cross-sectional studies have investigated associations between socioeconomic status and body weight and obesity (see 1 for a review). Results generally demonstrate that among
25 women in developed societies, socioeconomic status is strongly inversely related to body weight and risk for overweight and obesity (2-7). Evidence for men is less consistent, with mixed results reported (e.g., 3, 8-13). The majority of previous studies are cross-sectional, and hence do not permit unequivocal conclusions as to the direction of effects between socio-economic status and obesity. Results of a limited number of prospective longitudinal studies support claims that low
30 socioeconomic status predicts weight gain and risk of obesity over time (14-16).

The majority of studies assess body weight using body mass index. It has been argued, however, that the distribution of body fat (assessed by waist-to-hip circumference ratio; waist-to-hip ratio) is more predictive of health problems than body mass index (17, 18). Findings of several recent
35 studies suggest that waist-to-hip ratio may also be related to socioeconomic factors including employment status, education, marital status and housing conditions (5, 19). The associations between socioeconomic status factors and body weight may differ depending on whether body mass index or waist-to-hip ratio is used as the index (5). However, evidence linking waist-to-hip ratio and socioeconomic status is limited. Moreover, despite a wealth of studies describing the links between
40 socioeconomic status, and body weight and obesity, very little is known about the nature of this relationship, or how socioeconomic status, and body weight and body fat distribution are linked.

Socioeconomic status is a complex, multidimensional construct, based on numerous major components including an individual's income, education, occupational prestige, and family
45 background. Although socioeconomic status is often considered a global construct, it has been suggested that individual components (e.g., education, occupation, income) represent different facets of socioeconomic status, and that studies of the mechanisms relating socioeconomic status to

obesity should investigate the individual components separately (1, 20). To date, few studies have empirically investigated simultaneously the associations between different components of socioeconomic status and body weight or obesity. Flegal et al. (9, 10) showed that body mass index was negatively related to income and to education for women. Among men, however, body mass index was positively related to income but the relationship with education was inconsistent. These studies highlight the importance of investigating different components of socioeconomic status in the same sample, since associations with body weight may differ depending on the domain assessed. An examination of the relationships between different socioeconomic status domains and body weight would identify groups at risk of overweight and obesity and provide insights into those specific socioeconomic status components which may impact on obesity.

This study investigates the associations between four empirically-derived components of socioeconomic status (employment, housing, migration status, and family unit), and body weight (body mass index), fat distribution (waist-to-hip ratio), and risk for overweight or a high waist-to-hip ratio, in a large national population sample of adult men and women. It was hypothesised that the four domains of socioeconomic status would be associated with body mass index, waist-to-hip ratio, and risk for overweight and a high waist-to-hip ratio. Consistent with previous findings, these associations were hypothesised to be stronger for women than for men.

Methods

Participants

Data were derived from the 1995 Australian National Nutrition Survey (21). These participants were recruited from the study population of the 1995 National Health Survey (22). The National Health Survey is part of a regular five-yearly population survey conducted by the Australian Bureau of Statistics, which collects health status information about Australians. Recruitment procedures for the 1995 National Health Survey and National Nutrition Survey surveys are described elsewhere

(21, 22). Briefly, for the National Health Survey, a nation-wide sample of 23,800 households was randomly obtained using a stratified multi-stage area sampling technique. Of households selected to participate, 91.5% households responded, with a total of 57,633 persons interviewed. Of those, 22,562 were selected to participate in the National Nutrition Survey. The sample for the National Nutrition Survey was systematically selected from the National Health Survey private dwelling sample covering urban and rural areas across all states and territories of Australia. A maximum of three people per household participating in the National Health Survey were randomly selected and invited to participate in the National Nutrition Survey.

A total of 13,858 persons participated in the National Nutrition Survey, representing a response rate of 61%. Of these participants, 10,754 were adults (18-79 years). The present study uses data provided by 8,667 adults (4,167 men; 4,500 women) of working age (18-64 years). Pregnant women (n=159) were excluded from analyses.

Measures

Height and weight: Height and weight were measured, without shoes and with only a single layer of light clothing, to the nearest 0.1 cm and 0.1 kg respectively using standardised procedures (21).

Body mass index was calculated as $weight\ in\ kilograms / (height\ in\ metres)^2$. Body mass index was classified according to the Australian National Health and Medical Research Council guidelines: underweight (<20 kg/m²); acceptable weight (20-25.00 kg/m²); overweight (25.01-30.00kg/m²) and obese (>30.0kg/m²) (23).

Waist-to-hip ratio: Waist and hip circumferences were measured over one layer of light indoor clothing. Two measurements were taken and recorded to the nearest 0.1cm, and the average of the two readings was used in analyses. Waist-to-hip ratio was calculated using the formula: waist-to-hip ratio = $Waist\ circumference\ (cm) / hip\ circumference\ (cm)$. Based on previous findings of

associations between high waist-to-hip ratio and increased risk for cardiovascular disease in adults
100 (24, 25), the cut-offs used to indicate high waist-to-hip ratio were 0.9 for men, and 0.8 for women.
Socioeconomic status: The age- and gender- specific socioeconomic status indices used in the
present analyses consisted of four factors derived from factor analyses of demographic and socio-
economic variables from the National Health Survey (26). Fourteen items were found to load
consistently on four conceptually meaningful socioeconomic status domains, given in the order of
105 relative rank as employment, housing, migration, and family unit. Descriptions of the 14 items
which loaded on the four socioeconomic status domains are outlined in Table 1. To obtain groups
representing high, middle and low socioeconomic status, tertiles of the factor scores were calculated
for each of the four domains, with the lowest tertile representing the most disadvantaged on that
socioeconomic status domain. For example, the high employment tertile included those working in
110 a salaried position or own business; working full-time; and/or working as managers or
professionals. The high housing group comprised those who owned homes, with more bedrooms.
The high migration group included those who were Australian born and spoke English. The high
family unit group included those who were not married or defacto; whose income was not shared;
and for men, those who left school after the age of 18 years.

115

INSERT TABLE 1

120

Age: Age in years was categorised as 18-24, 25-34, 35-44, 45-54, and 55-64.

Procedure

Trained interviewers personally interviewed participants in the National Health Survey. At the
125 completion of the National Health Survey interview, selected participants were informed of the
National Nutrition Survey and agreement was sought for this interview. Height, weight and waist-
to-hip measurements were taken by trained interviewers.

Statistical Analysis

130 Descriptive statistics for body mass index and waist-to-hip ratio scores (mean and standard
deviation) were calculated for each gender, and univariate analyses (ANOVA) were used to
compare means for sub-groups of participants according to sociodemographic items. To provide a
comprehensive overview of the relationships between socioeconomic status and body mass
index/waist-to-hip ratio, associations of body mass index/waist-to-hip ratio with individual
135 sociodemographic items, as well as with broader socioeconomic status domains, were investigated.
Age adjusted means and 95% confidence intervals were estimated for body mass index and waist-
to-hip ratio, using the least square means option of the general linear models procedure of SAS (27).
Bonferroni corrections were used to reduce the effects of inflated type 1 errors due to multiple
comparisons (28).

140

Body mass index was further categorised as 'overweight' combining the overweight and obese
categories (≥ 25 kg/m²), and 'not overweight' combining the underweight and acceptable weight
categories (< 25 kg/m²). The waist-to-hip ratio was categorised as high (male: waist-to-hip ratio $>$
0.9; female: waist-to-hip ratio $>$ 0.8) or low.

145

The proportion of participants being overweight was then calculated for each category in the four
socioeconomic status domains. Logistic regression modelling was used to determine the age-
adjusted odds ratios (OR) and 95% confidence intervals (95% CI) for being overweight, and for
having high waist-to-hip ratio, with each socioeconomic status domain score treated as an ordinal
150 categorical variable.

Results

Sixty-five percent of men and 47% women were overweight or obese; 54% of men and 32% of women had a high waist-to-hip ratio. Mean (SD) of body mass index and waist-to-hip ratio scores for groups of respondents, categorised according to sociodemographic items are shown in Table 2. Men with the lowest body mass index had one or more of the following characteristics: they came from households that didn't speak English; were single; lived in households with shared incomes; and left school after the age of 18 years. Women who left school after age 18, worked full-time, or were managers or professionals also had the lowest body mass indexes. Only for women were there significant associations between waist-to-hip ratio and the items "whether the household usually speaks English", "year of arrival in Australia", and "ability to speak English".

INSERT TABLE 2

The age-adjusted means for body mass index and waist-to-hip ratio, in relation to the categories of socioeconomic status domains are shown in Table 3. Among men, those who were married or lived in shared income households had both a high body mass index and waist-to-hip ratio, however those who were living in rental premises or in dwellings with less than three bedrooms had a high body mass index and a low waist-to-hip ratio. Among women, the domain employment was a significant predictor of body mass index and waist-to-hip ratio, with those in the highest tertile (i.e. full-time managers or professionals) having the lowest age-adjusted body mass index and waist-to-hip ratio. Women who were married or living in households with shared incomes also had slightly higher waist-to-hip ratio.

INSERT TABLE 3

The age-adjusted odds ratios for overweight and high waist-to-hip ratio in relation to the categories of socioeconomic status domains are shown in Table 4. Among men, the likelihood of being

overweight was reduced by 30% for those in the lowest tertile category of the employment domain
180 (compared with those in the high tertile), OR=0.7, 95% CI = 0.6-0.8. However, for women the
likelihood of being overweight was increased by 40% for those in the lowest tertile of the domain
employment (compared with those in the high tertile), OR= 1.4, 95% CI =1.2-1.7. In both genders,
the likelihood of high waist-to-hip ratio was increased by 20-80% in people who were married and
with less schooling (compared with those who were single, who's income was not shared, and who
185 had more schooling), OR = 1.8, 95% CI = 1.5-2.2 for men, OR=1.2, 95% CI = 1.0-1.5 for women.

INSERT TABLE 4

Discussion

190 Research that has examined the relationship between socioeconomic status and a variety of health
outcomes has suggested the need to move beyond describing socioeconomic status gradients in
health outcomes, to positing and testing theoretical models explaining these differences (29, 30).
Despite a substantial research literature describing associations between socioeconomic status and
body weight, there has been little empirical investigation of the mechanisms underlying
195 socioeconomic status gradients in obesity. This study, while not etiological in nature, is one of very
few which has attempted to move beyond description of the relationships of body weight with broad
socioeconomic status and begin to explore which specific domains of socioeconomic status are
related to body weight, body fat distribution, and risk for overweight or high waist-to-hip ratio.
Partial support was obtained for the hypothesis that the four socioeconomic status domains would
200 be associated with body mass index and waist-to-hip ratio. However, these findings suggest that
housing and migration domains may not be as important in predicting body weight and body fat as
other indicators of socioeconomic status such as employment and marital status.

Among women, those scoring highest on the employment factor (e.g., women employed full-time
205 as managers or professionals) had lower body mass indexes, waist-to-hip ratios, and risk of
overweight than women who scored lower on the employment factor. Among men, the relationships
were less consistent. Waist-to-hip ratio was not associated with employment for men, and the
relationship of employment with risk of overweight was the reverse to that among women: men
who scored lower on the employment domain were at lower risk of being overweight than those
210 scoring higher. These gender differences in socioeconomic status-weight associations are consistent
with past findings (1) and suggest that employment components of socioeconomic status may
impact differentially on body weight for men and women.

Based on these findings, potential mechanisms governing specific socioeconomic status gradients in
215 obesity may be posited. For example, it may be that employment status structures lifestyle, and
hence diet and physical activity opportunities.

Associations were also demonstrated between the family unit socioeconomic status domain, and
several indices of body weight. In contrast to findings for the employment domain, these
220 associations were particularly strong for men. Men who were married, living in households with
shared income and who had less education had higher body mass index, higher waist-to-hip ratio,
and increased risk of overweight or a high waist-to-hip ratio than men who were single, living in a
household not sharing income, and who had more education. Among women, there was a weaker
association, in the same direction, between family unit and waist-to-hip ratio only. These outcomes
225 are consistent with previous findings that being married is positively associated with body mass
index in men but not women (5). It may be postulated that a higher income may govern access to
material resources for obesity prevention. Similarly, education may be related to obesity primarily
through shaping knowledge about diet, physical activity, and the health effects of obesity (20).

230 It is important to recognize that the present findings are based on cross-sectional data, and a causal relationship cannot be inferred. The association between aspects of socioeconomic status and body weight may be due to the influence of obesity leading to a decrease in socioeconomic status. For example, negative stereotyping and stigmatization of obese individuals may result in restricted opportunities for social advancement in education, employment, or relationships (31). In addition, 235 the present findings of gender differences in socioeconomic status-obesity relationships may reflect different mechanisms underlying the associations of socioeconomic status and body weight among men and women. Future investigations, particularly involving longitudinal, prospective studies, should explore further the directional effects of these relationships among men and women, and also investigate the potential pathways through which socioeconomic status and obesity may be 240 linked. For example, socioeconomic status gradients have been reported in certain health behaviours implicated in obesity. Lower socioeconomic status groups are less likely to participate in regular physical activity, for instance (32), and may be more likely to eat a high-fat diet (33). These socioeconomic status differentials in weight-related behaviours may account at least partly for the relationships between certain domains of socioeconomic status and body weight and fat.

245

The development and empirical evaluation of theoretical models of socioeconomic status and obesity will advance understanding of the pathways between these factors, and should be a priority of future research. An understanding of the aspects of socioeconomic status which are related to body weight is crucial in determining the nature of the relationships between these factors and 250 considering strategies to prevent obesity in high risk population groups. Obesity prevention efforts would benefit from identifying how each socioeconomic status dimension is related to body weight and fat, and considering gender specific strategies to address each dimension. These findings suggest that further investigation of employment, and marital and family domains as they relate to obesity may be fruitful.

255

Acknowledgements

Kylie Ball is supported by a Public Health Postdoctoral Research Fellowship from the Australian National Health and Medical Research Council.

260 David Crawford is supported by a Nutrition Research Fellowship from the National Heart Foundation of Australia.

References

- 265 1 Sobal J, Stunkard AJ. Socioeconomic status and obesity: A review of the literature. *Psych Bull* 1989; **105**: 260-75.
- 2 Jeffery RW, Folsom AR, Leupker RV, Jacobs DR, Gillum RF, Taylor HL, Blackburn H. et al. Prevalence of overweight and weight loss behavior in a metropolitan adult population: The Minnesota Heart Survey experience. *Am J Public Health* 1984; **74**: 349-52.
- 270 3 Jeffery RW, French SA, Forster JL, Spry VM. Socioeconomic status differences in health behaviours related to obesity: the Healthy Worker Project. *Int J Obes* 1991; **15**: 689-96.
- 4 Power C, Moynihan C. Social class changes and weight-for-height between childhood and early adulthood. *Int J Obes* 1988; **12**: 445-53.
- 5 Rosmond R, Bjorntorp P. Psychosocial and socio-economic factors in women and their
275 relationship to obesity and regional body fat distribution. *Int J Obes* 1999; **23**: 138-45.
- 6 Simons LA, Simons J, Magnus P, Bennett SA. Education level and coronary risk factors in Australia. *Med J Aust* 1986; **145**: 446-50.
- 7 Wamala SP, Wolk A, Orth-Gomer K. Determinants of obesity in relation to socioeconomic status among middle-aged Swedish women. *Prev Med* 1997; **26**: 734-44.
- 280 8 Bennet SA. Cardiovascular risk factors in Australia: Trends in socioeconomic inequalities. *J Epidemiol Community Health* 1985; **45**: 363-72.
- 9 Flegal KM, Harlan WR, Landis JR. Secular trends in body mass index factors in young adult women. *Am J Clin Nutr* 1988; **48**: 535-43.
- 10 Flegal KM, Harlan WR, Landis JR. Secular trends in body mass index factors in young adult
285 men. *Am J Clin Nutr* 1988; **48**: 544-51.
- 11 Opit LJ, Oliver G, Salzberg M. Occupation and blood pressure. *Med J Aust* 1984; **140**: 760-4.
- 12 Ross G, Mirowski J. Social epidemiology of overweight: A substantive and methodological investigation. *J Health Soc Behav* 1983; **24**: 288-98.

- 13 Sorenson TIA. Socio-economic aspects of obesity: causes or effects? *Int J Obes* 1995; **19**
290 (supplement 6): S6-S8.
- 14 Braddon FE, Rogers B, Wadsworth ME, Davies J. Onset of obesity in a 36 year birth cohort
study. *BMJ* 1986; **293**: 299-303.
- 15 Lahmann PH, Lissner L, Gullberg B, Berglund G. Sociodemographic factors associated with
long-term weight gain, current body fatness and central adiposity in Swedish women. *Int J Obes*
295 2000; **24**: 685-94.
- 16 Molarius A, Seidell JC, Sans S, Tuomilehto J, Kuulasmaa K. Educational level, relative body
weight, and changes in their association over 10 years: An international perspective from the WHO
MONICA Project. *Am J Public Health*, 2000; **90**: 1260-8.
- 17 Larsson B, Svardsudd K, Welin L, Wilhelmsen L, Bjorntorp P, Tibblin G. Abdominal adipose
300 tissue distribution, obesity, and risk of cardiovascular disease and death: 13 year follow up of
participants in the study of men born in 1913. *BMJ* 1984; **288**: 1401-4.
- 18 Bruning PF, Bonfrer JMG, Hart AAM, van Noord PAH, van der Hoeven H, Collette HJA,
Battermann JJ, De Jong-Bakker M, Nooijen WJ, De Waard F. Body measurements, estrogen
availability and the risk of human breast cancer: a case-control study. *Int J Cancer* 1992; **51**: 14-9.
- 305 19 Rosmond R, Lapidus L, Bjorntorp P. The influence of occupational and social factors on obesity
and body fat distribution in middle-aged men. *Int J Obes* 1996; **20**: 599-607.
- 20 Sobal J. Obesity and socioeconomic status: A framework for examining relationships between
physical and social variables. *Med Anthropol* 1991; **13**: 231-47.
- 21 Australian Bureau of Statistics. *National Nutrition Survey: User's Guide, 1995, Catalogue No.*
310 *4801.0*. Canberra: Australian Bureau of Statistics, 1998.
- 22 Australian Bureau of Statistics. *National Health Survey: Users' Guide, Catalogue No. 4363.0*.
Canberra: Australian Bureau of Statistics, 1995.

- 23 National Health and Medical Research Council. *Acting on Australia's weight: A strategic plan for the prevention of overweight and obesity*. Canberra: Australian Government Publishing Service, 315 1997.
- 24 Alexander H, Dugdale AE. Which waist-hip ratio? *Med J Aust* 1990; **153**: 367-8.
- 25 Ball MJ, Wilson BD, Robertson IK, Russell DG. Obesity and body fat distribution in New Zealanders: a pattern of coronary heart disease risk. *NZ Med J* 1993; **106**: 69-72.
- 26 Mishra GD, Ball K, Dobson AJ, Byles JE, Warner-Smith P. The measurement of socioeconomic 320 status: Investigation of gender- and age-specific indicators in Australia: National Health Survey '95. *Social Indicators Research*: in press.
- 27 SAS Institute Inc. *SAS/STAT User's Guide*, (Version 6, 4th ed., Vol. 2). Cary, NC: SAS Institute Inc., 1989.
- 28 Neter J, Kutner MH, Nachtsheim CJ, Wasserman W. *Applied Linear Statistical Model*. Chicago: 325 Irwin, 1996.
- 29 Martikainen P, Stansfeld S, Hemingway H, Marmot M. Determinants of socioeconomic differences in change in physical and mental functioning. *Soc Sci Med* 1999; **49**: 499-507.
- 30 Ostrove JM, Adler NE. Socioeconomic status and health. *Curr Opin Psychiatry* 1998; **11**: 649-53.
- 330 31 Gortmaker SL, Must A, Perrin JM, Sobal AM, Dietz WH. Social economic consequences of overweight in adolescence and young adulthood. *N Engl J Med* 1993; **329**: 1008-12.
- 32 Crespo CJ, Ainsworth BE, Keteyian SJ, Heath GW, Smit E. Prevalence of physical inactivity and its relation to social class in U.S. adults: results from the Third National Health and Nutrition Examination Survey, 1988-1994. *Med Sci Sports Exerc* 1999; **31**(12): 1821-7.
- 335 33 Milligan RAK, Burke V, Beilin LJ, Dunbar DL. Influence of gender and socioeconomic status on dietary patterns and nutrient intakes in 18-year old Australians. *Aust NZ J Public Health* 1998; **22**: 485-93.

Table 1: Variable names and descriptions of items from the National Health Survey '95 loading on four conceptual socioeconomic status domains

Domains	Item description
Employment	Usual hours worked Employment status Number of jobs Income main source Whether government pension/benefit is received Occupation
Housing	Number of bedrooms Nature of occupancy
Migration	Whether household usually speaks English Year of arrival Ability to speak English
Family Unit	Marital status Income unit number (number related persons within household whose command over income is shared) Age first left school*

*For women, this item is omitted from the family unit domain.

Table 2: Body mass index and waist-to-hip ratio scores by sociodemographic items and gender

Items	Men			Women		
	N	Body Mass Index Mean (SD)	Waist-to-hip ratio Mean (SD)	N	Body Mass Index Mean (SD)	Waist-to-hip ratio Mean (SD)
Overall	4167	26.8 (4.1)	0.912 (0.071)	4500	25.8 (5.2)	0.779 (0.064)
Employment status			***		***	***
Unemployed (looking for work)	241	26.4 (4.6)	0.90 (0.1)	167	25.3 (6.0)	0.77 (0.1)
Not in labour force	475	27.0 (4.8)	0.94 (0.1)	1427	26.9 (5.7)	0.80 (0.1)
Employed	3412	26.8 (4.0)	0.91 (0.1)	2853	25.3 (4.9)	0.77 (0.1)
Usual hours worked			***		***	***
Not Applicable	716	26.8 (4.7)	0.93 (0.1)	1594	26.7 (5.7)	0.80 (0.1)
1-34 hours	358	26.4 (4.3)	0.90 (0.1)	1235	25.6 (5.1)	0.78 (0.1)
35 hours or more	3054	26.9 (3.9)	0.91 (0.1)	1618	25.0 (4.7)	0.76 (0.1)
Income main source			***		***	***
Not Applicable	64	26.3 (4.8)	0.90 (0.1)	207	26.8 (5.3)	0.80 (0.1)
Govt.pension/benefit; Superannuation; Interest/dividends; Other	876	26.9 (4.6)	0.93 (0.1)	1678	26.5 (5.7)	0.79 (0.1)
Wages/salary; Own business/share in partnership	3188	26.8 (3.9)	0.91 (0.1)	2562	25.2 (4.8)	0.77 (0.1)
Occupation			***		***	***
Not applicable; not stated; members of Armed forces	718	26.8 (4.7)	0.93 (0.1)	1585	26.7 (5.7)	0.80 (0.1)
Salespersons; personal service workers, plant/ machine operators/drivers labourers and related	1139	27.0 (4.2)	0.91 (0.1)	995	25.5 (5.0)	0.77 (0.1)
Para-professionals tradespersons; clerks	1166	26.6 (4.0)	0.90 (0.1)	1166	25.2 (4.9)	0.77 (0.1)
Managers, Administrators; Professionals	1105	26.9 (3.6)	0.90 (0.1)	701	25.0 (4.7)	0.76 (0.1)
Govt. pension/benefit received			***		***	***
Receives pension/benefits	690	26.9 (4.9)	0.92 (0.1)	1243	26.7 (6.0)	0.80 (0.1)
Doesn't receive pension/benefits	3438	26.8 (3.9)	0.91 (0.1)	3204	25.4 (4.9)	0.77 (0.1)
Number of jobs			***		***	***
Not applicable	697	26.8 (4.8)	0.93 (0.1)	1553	26.7 (5.7)	0.80 (0.1)
More than one job	314	26.9 (4.1)	0.91 (0.1)	314	25.3 (4.9)	0.77 (0.1)
One job	3117	26.8 (3.9)	0.91 (0.1)	2580	25.3 (4.9)	0.77 (0.1)

Table 2 (continued)

Items	N	Men		N	Women	
		Body Mass Index Mean (SD)	Waist-to-hip ratio Mean (SD)		Body Mass Index Mean (SD)	Waist-to-hip ratio Mean (SD)
Number of bedrooms		***	***		***	*
Not applicable	1981	26.7 (4.2)	0.90 (0.1)	1907	25.5 (5.2)	0.78 (0.1)
One or two	567	26.2 (4.1)	0.91 (0.1)	620	25.4 (5.4)	0.77 (0.1)
Three	1079	27.0 (4.1)	0.92 (0.1)	1351	26.3 (5.4)	0.78 (0.1)
Four or more	502	27.2 (3.9)	0.92 (0.1)	569	25.9 (4.8)	0.78 (0.1)
Nature of occupancy		***	***		***	***
Not applicable/other	2027	26.7 (4.2)	0.90 (0.1)	1953	25.5 (5.2)	0.78 (0.1)
Renter	653	26.2 (4.3)	0.90 (0.1)	785	25.7 (5.7)	0.78 (0.1)
Purchaser	759	27.0 (3.8)	0.94 (0.1)	867	25.7 (5.1)	0.77 (0.1)
Owner	689	27.4 (4.0)	0.91 (0.1)	842	26.6 (5.2)	0.79 (0.1)
English speaking household		**				***
Doesn't speak English	172	25.9 (4.4)	0.91 (0.1)	189	25.7 (4.7)	0.80 (0.1)
Usually speak English	3956	26.8 (4.1)	0.91 (0.1)	4258	25.8 (5.3)	0.78 (0.1)
Year of arrival					*	**
Migrated to Australia	1016	26.7 (4.0)	0.92 (0.1)	1110	25.4 (4.9)	0.78 (0.1)
Australian born	3112	26.8 (4.2)	0.91 (0.1)	3337	25.9 (5.4)	0.79 (0.1)
Ability to speak English						***
Not able to speak English fluently	135	26.7 (4.7)	0.91 (0.1)	93	26.5 (5.0)	0.80 (0.1)
Speaks fluent English	3993	26.8 (4.1)	0.91 (0.1)	4354	25.8 (5.3)	0.78 (0.1)
Marital status		***	***		***	***
Married; defacto	2801	27.3 (3.9)	0.92 (0.1)	2980	26.0 (5.1)	0.78 (0.1)
Never married; separated/ divorced; widowed	1327	25.9 (4.3)	0.89 (0.1)	1467	25.8 (5.3)	0.77 (0.1)
Income unit number		***	***		***	***
One income	3766	26.9 (4.1)	0.92 (0.1)	4197	25.9 (5.2)	0.78 (0.1)
More than one income	362	25.8 (4.6)	0.87 (0.1)	250	24.6 (5.4)	0.75 (0.1)
Age first left school		***	***		***	***
Under 15 years	445	28.3 (4.3)	0.96 (0.1)	521	27.7 (5.6)	0.81 (0.1)
15-17 years	2894	26.8 (4.1)	0.91 (0.1)	3239	25.8 (5.2)	0.78 (0.1)
18 years or over	789	25.9 (4.0)	0.89 (0.1)	687	24.4 (4.6)	0.76 (0.1)

***P-values <0.001, ** 0.001 ≤ p-values < 0.01, * 0.01 ≤ p-values <0.05

Table 3: Age-adjusted means and 95% confidence intervals for socioeconomic status domains by Body Mass Index and Waist-to-hip ratio scores

	Men		Women	
	Body Mass Index Mean (95%CI)	Waist-to-hip ratio Mean (95%CI)	Body Mass Index Mean (95%CI)	Waist-to-hip ratio Mean (95%CI)
Employment			*	*
High	26.9 (26.6 - 27.1)	0.909 (0.906 - 0.912)	25.4 (25.1 - 25.6)	0.767 (0.764 - 0.770)
Middle	26.9 (26.7 - 27.1)	0.913 (0.910 - 0.916)	25.6 (25.4 - 25.9)	0.778 (0.775 - 0.781)
Low	26.6 (26.4 - 26.8)	0.914 (0.910 - 0.917)	26.4 (26.1 - 26.6)	0.793 (0.790 - 0.796)
Housing	*	*		
High	26.9 (26.7 - 27.1)	0.915 (0.912 - 0.919)	25.6 (25.4 - 25.9)	0.777 (0.774 - 0.780)
Middle	26.5 (26.3 - 26.7)	0.910 (0.907 - 0.913)	26.0 (25.7 - 26.2)	0.782 (0.779 - 0.785)
Low	27.0 (26.8 - 27.2)	0.910 (0.907 - 0.914)	25.7 (25.5 - 26.0)	0.780 (0.776 - 0.782)
Migration				
High	26.8 (26.6 - 27.0)	0.913 (0.910 - 0.917)	25.8 (25.6 - 26.1)	0.778 (0.775 - 0.782)
Middle	26.9 (26.7 - 27.1)	0.912 (0.908 - 0.915)	25.9 (25.6 - 26.1)	0.779 (0.776 - 0.782)
Low	26.8 (26.5 - 27.0)	0.911 (0.907 - 0.914)	25.6 (25.4 - 25.9)	0.780 (0.777 - 0.783)
Family Unit	*	*		*
High	26.3 (26.1 - 26.5)	0.901 (0.897 - 0.904)	25.8 (25.5 - 26.0)	0.775 (0.771 - 0.778)
Middle	26.9 (26.7 - 27.2)	0.915 (0.911 - 0.918)	25.9 (25.6 - 26.1)	0.781 (0.778 - 0.784)
Low	27.2 (27.0 - 27.4)	0.920 (0.916 - 0.924)	25.7 (25.4 - 26.0)	0.783 (0.780 - 0.786)

* Significant association ($p < .05$) between socioeconomic status domain and Body Mass Index or Waist-to-hip ratio.

Table 4: Age-adjusted odds ratios (OR) and 95% confidence intervals (CI) for overweight by the socioeconomic status domains (% = proportion of people in the overweight category).

	Men				Women			
	%	Body Mass Index OR (95%CI)	%	Waist-to-hip ratio OR (95%CI)	%	Body Mass Index OR (95%CI)	%	Waist-to-hip ratio OR (95%CI)
Employment								
High	66.9	1.0	52.8	1.0	42.5	1.0	24.3	1.0
Middle	65.3	0.9 (0.8 - 1.1)	53.1	1.1 (0.9 - 1.3)	44.6	1.2 (1.0 - 1.4)	29.7	1.4 (1.2 - 1.7)
Low	62.4	0.7 (0.6 - 0.8)	57.0	1.0 (0.8 - 1.2)	65.0	1.4 (1.2 - 1.7)	43.5	2.0 (1.7 - 2.4)
Housing								
High	70.2	1.0	63.4	1.0	44.1	1.0	29.6	1.0
Middle	59.4	0.8 (0.7 - 0.9)	48.3	0.9 (0.7 - 1.1)	50.8	1.3 (1.1 - 1.5)	34.9	1.2 (1.0 - 1.4)
Low	65.0	0.9 (0.8 - 1.1)	51.1	0.8 (0.7 - 1.1)	47.2	1.1 (0.9 - 1.3)	32.8	1.2(1.0 - 1.4)
Migration								
High	67.7	1.0	59.4	1.0	45.0	1.0	31.1	1.0
Middle	60.8	1.0 (0.8 - 1.2)	48.7	1.0 (0.8 - 1.2)	48.4	1.0 (0.9 - 1.2)	32.7	1.0 (0.9 - 1.2)
Low	66.0	1.0 (0.8 - 1.2)	54.8	0.9 (0.7 - 1.1)	48.7	1.0 (0.8 - 1.2)	33.5	1.0 (0.9 - 1.2)
Family Unit								
High	54.4	1.0	39.2	1.0	45.1	1.0	27.7	1.0
Middle	67.9	1.4 (1.2 - 1.6)	58.5	1.6 (1.4 - 1.9)	47.8	1.0 (0.8 - 1.1)	33.7	1.1 (1.0 - 1.3)
Low	72.5	1.6 (1.4 - 2.0)	65.1	1.8 (1.5 - 2.2)	49.2	1.0 (0.8 - 1.2)	35.9	1.2 (1.0 - 1.5)