



Risk Factors

Central Adiposity

Stage 3

Epidemiological Series Report # 2011 - 22

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Introduction

The following overview presents information about central adiposity among the participants of the North West Adelaide Health Study, and the demographics, chronic conditions and risk factors associated with smoking. Stage 1 of the study was conducted between 2000 and 2003, with Stage 2 conducted from 2004 to 2006, and Stage 3 conducted from 2008 to 2010.

Measurement and definition of central adiposity

Central adiposity as measured by waist hip ratio (WHR) and waist circumference (WC) which can be calculated from measurements undertaken at the study clinic of waist and hip circumference using a standard measuring tape. Where body mass index (BMI) is a summary of overall height and weight, or total adiposity, WHR provides a measure of fat distribution. A WHR of greater than 1.0 for men or 0.85 for women is indicative of android obesity¹. A high WC is indicative of android obesity; it is recommended that no further weight should be gained if the WC is greater than or equal to 95 cm for men or 80cm for women. A WC of ≥ 100 cm for males and ≥ 90 cm for females is the level at which weight reduction is advised^{2,3}.

Proportion of those with a high waist circumference – Stage 1, Stage 2 & Stage 3

The proportion of participants with a high waist circumference for Stages 1, 2 and 3 is shown in Table 1. Overall, **55.1%** (95% CI 53.1-57.0) in Stage 1, **62.0%** (95% CI 59.6-64.4) in Stage 2 and **64.3%** (95% CI 61.3-67.1) in Stage 3 of study participants had a high waist circumference.

Table 1: Proportion of those with a high waist circumference (≥ 95 cm men and 80cm women)

	Stage 1		Stage 2		Stage 3	
	n	%	n	%	n	%
No	1822	44.9	1204	38.0	888	35.8
Yes	2234	55.1	1968	62.0	1596	64.3
Total	4056	100.0	3172	100.0	2484	100.0

* Note: The weighting of data can result in rounding discrepancies or totals not adding.

Proportion of those with a high waist-hip ratio – Stage 1, Stage 2 & Stage 3

The proportion of participants with a high waist-hip ratio for Stages 1, 2 and 3 is shown in Table 2. Overall, **16.4%** (95% CI 15.2-17.7) in Stage 1, **23.3%** (95% CI 21.5-25.2) in Stage 2 and **26.1%** (95% CI 23.9-28.3) in Stage 3 of study participants had a high waist-hip ratio.

Table 2: Proportion of those with a high waist hip ratio (WHR > 1.0 men and 0.85 women)

	Stage 1		Stage 2		Stage 3	
	n	%	n	%	n	%
No	3389	83.6	2433	76.7	1836	74.0
Yes	665	16.4	738	23.3	647	26.1
Total	4054	100.0	3170	100.0	2483	100.0

* Note: The weighting of data can result in rounding discrepancies or totals not adding.

Explanation of statistical terms used in this report

Incident rate is a measure of risk of developing a condition or risk factor within a specified period of time, often one year but in this report per 1000 person years. This allows for different amounts of observation times among participants between the baseline and Stage 3 results (ranging from 2000-2003 to 2008-2010). The incident rates were calculated without adjusting for age in this report. *For example, in a population of 1000 people, if 28 people develop a disease over two years, this would be expressed as 14 incident cases over 1000 person years (28 cases per 1000 divided by 2 years).*

Hazard ratio (HR) is the ratio of the hazard rates corresponding to a chronic condition or risk factor developing in the different groups over time – in this case, the time since the baseline examination (between 2000 and 2003). This allows for different amounts of observation times among participants between the baseline and Stage 3 results (ranging from 2000-2003 to 2008-2010). *For example, looking at cardiovascular disease, a hazard ratio of 2 for overweight or obese people implies that twice as many people with this risk factor have developed cardiovascular disease in this time compared to the reference group (those who are underweight or who have a healthy weight with a hazard ratio of 1).*

Adjusting for age is a technique used to better allow populations to be compared when the age profiles of the populations are quite different.

¹ O'Dea K, Walker K, Colagiuri S, Hepburn A, Holt P, Colagiuri R.. *Evidence Based Guidelines for Type 2 Diabetes Mellitus. Primary Prevention. Canberra: Diabetes Australia and NHMRC; 2002*

² Han T, va Leer E, Seidell J, Lean M. Waist circumference action levels in the identification of cardiovascular risk factors: prevalence study in a random sample. *BMJ* 1995; 311:1401-5

³ Lean M, Han T, Morrison C: Waist circumference as a measure for indicating need for weight management. *BMJ* 1995; 311:158-61

Tables 3 and 4 present the incidence rate per 1000 person years among those participants who did not have a high waist hip ratio at baseline Stage 1 (570 incident cases).

Demographic profile of those with a high waist-hip ratio

The risk of developing a high waist hip ratio among study participants who did not have a high waist-hip ratio at baseline was statistically significantly higher among females, those aged 50 years and over, adults with a step, sole, shared or other parenting arrangement, or those who were unemployed (Table 3).

Table 3: Hazard ratios for demographic variables associated with a high waist hip ratio

Variable	n	New Cases (N) [†]	Incidence rate (1000 person yrs) [†]	HR (95%CI)**	p value**
Sex					
Male	1495	252	26.4	1	
Female	1251	318	39.7	1.51 (1.25-1.81)	<0.001
Age group					
Up to 49 years	1709	276	24.6	1	
50 to 59 years	418	124	45.8	2.01 (1.60-2.52)	<0.001
60 years and over	619	171	46.8	2.06 (1.66-2.54)	<0.001
Highest education level obtained*					
Secondary	1109	253	36.4	1	
Trade/apprenticeship/cert/diploma	1171	235	30.9	0.85 (0.69-1.03)	0.103
Bachelor degree or higher	357	55	23.0	0.74 (0.53-1.03)	0.075
Gross annual household income*					
Up to \$20,000	541	140	42.8	1	
\$20,001- 40,000	670	141	31.9	1.02 (0.77-1.34)	0.904
\$40,001- 60,000	634	134	32.5	1.18 (0.86-1.61)	0.300
More than \$60,000	756	126	25.6	0.96 (0.70-1.33)	0.806
Family structure*					
Family & children, two biological/ adoptive parents	946	162	26.4	1	
Adult living with partner, no children	698	183	40.2	0.97 (0.75-1.27)	0.829
Adult living alone	313	74	38.1	0.84 (0.62-1.13)	0.243
Adults – related/unrelated, living together	252	45	29.3	0.87 (0.60-1.27)	0.481
Step/sole/shared parenting & other	260	69	42.8	1.51 (1.03-2.21)	0.033
Marital status*					
Married or living with partner	1816	408	34.8	1	
Separated/divorced	211	58	43.7	1.24 (0.98-1.58)	0.069
Widowed	132	34	44.5	0.85 (0.61-1.20)	0.358
Never married	574	67	18.2	0.78 (0.51-1.20)	0.258
Work status*					
Full time employed	1158	206	27.2	1	
Part time/casual employed	460	91	29.4	1.05 (0.80-1.38)	0.720
Unemployed	108	30	45.8	1.88 (1.14-3.12)	0.014
Home duties/retired	790	211	44.4	0.97 (0.73-1.27)	0.814
Student/other	204	26	19.3	0.85 (0.51-1.41)	0.526

* Don't know/ refused/ not stated category not reported

** All variables adjusted for age (except for age group) to calculate hazard ratio

† Not adjusted for age

Chronic condition and risk factor profile of those with a high waist-hip ratio

The risk of a high waist-hip ratio among study participants who did not have a high waist-hip ratio at baseline was statistically significantly higher among those with diabetes or arthritis, those who had a low alcohol risk, those who were overweight or obese, or those with high total cholesterol or high blood pressure, and statistically significantly lower among those who undertook some exercise, than those without these risk factors (Table 4).

Table 4: Hazard ratios for risk factors and chronic diseases associated with a high waist hip ratio

Variable	n	New Cases (N) [†]	Incidence rate (1000 person yrs) [†]	HR (95%CI)**	p value**
Diabetes					
No	2603	511	30.5	1	
Yes	143	60	74.6	2.04 (1.54-2.70)	<0.001
Arthritis					
No	2060	384	28.7	1	
Yes	506	162	51.7	1.31 (1.06-1.62)	0.014
Smoking*					
Non-smoker	1285	274	33.4	1	
Ex-smoker	805	169	32.9	0.87 (0.73-1.08)	0.237
Current smoker	645	126	29.8	1.07 (0.82-1.40)	0.622
Alcohol risk					
Non-drinker/ No risk	1517	277	29.0	1	
Low risk	1052	252	36.8	1.40 (1.16-1.70)	0.001
Intermediate to very high risk	164	36	33.0	1.38 (0.92-2.06)	0.120
Physical activity					
Sedentary	686	171	39.4	1	
Undertake some exercise	1847	354	29.7	0.77 (0.63-0.94)	0.010
BMI[^]					
Underweight/Normal (under 25)	1068	93	12.9	1	
Overweight (25 to 29.9)	1084	247	36.2	2.51 (1.92-3.29)	<0.001
Obese (30 and over)	592	230	66.0	4.98 (3.83-6.47)	<0.001
High total cholesterol (≥5.5mmol/L)[^]					
No	1741	302	27.1	1	
Yes	965	256	41.4	1.32 (1.10-1.59)	0.003
High blood pressure (≥140/90mmHg)[^]					
No	2008	338	25.9	1	
Yes	738	233	51.3	1.51 (1.24-1.83)	<0.001

* Don't know/ refused/ not stated category not reported

** All variables adjusted for age (except for age group) to calculate hazard ratio

† Not adjusted for age

[^] Biomedical measurement

This document is one of a series of reports concerning Stage 3 of the North West Adelaide Health Study. Please see the website for other reports in the series - www.health.adelaide.edu.au/pros/data/nwahs/.

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