

# Cardiovascular risk among urban Aboriginal people

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NATIONAL HEALTH STATISTICS reveal the continuing poor cardiovascular health of Indigenous Australians<sup>1</sup>. Adult Aboriginal people have a life expectancy 10–14 years shorter than non-Aboriginal Australians, primarily due to cardiovascular disease. Although the 2001 National Health Survey<sup>1</sup> included data on self-reported health behaviours in Indigenous populations by region, there are no detailed data on the patterns of cardiovascular risk in urban Aboriginal populations.

The Western Australian Centre for Aboriginal Cardiovascular Health, established in 1997 to determine the feasibility of detecting people at high risk for cardiovascular disease in Perth's Aboriginal population, undertook the Perth Aboriginal Atherosclerosis Risk Study (PAARS). We report the initial outcomes of the study.

## METHODS

### Community consultation

Discussions were held with the Perth Aboriginal community and the Board of Management of the Derbarl Yerrigan Health Service (the Perth Aboriginal Medical Service). A memorandum of understanding covered the conduct of the study, aspects related to respect for Aboriginal and Nyoongar culture, and confidentiality of results.

### Informed consent and ethical approval

Each participant provided written informed consent. The form was developed in consultation with Aboriginal community members and followed

## ABSTRACT

**Objective:** To describe the results of a program for detecting high cardiovascular risk in an urban Aboriginal community.

**Design:** Cardiovascular risk assessment program conducted between January 1998 and October 1999. Participants completed a questionnaire and underwent a physical assessment and biochemical tests.

**Participants:** 738 self-selected members of the Perth Aboriginal community (332 men, 406 women; age range, 18–79 years).

**Results:** The participants represented approximately a fifth of the Perth Aboriginal population aged 25–64 years (those aged 18–24 years comprised <5% of Aboriginals aged 15–24 years in Perth). Eighty-four per cent fell within National Heart Foundation "high risk" or "highest risk" categories for cardiovascular disease; 15% of men and 6% of women had an absolute risk of a cardiovascular event of over 15% within 10 years. A high proportion of participants reported diabetes, hypertension, smoking, overweight and obesity. A fasting plasma glucose level indicative of diabetes or impaired fasting glucose was found in 8.6% (95% CI, 6.2%–11%) of people not previously known to have diabetes. Obesity and smoking were twice as prevalent in study participants as in the general population. Less than a third of subjects with hypertension and diabetes had attained recommended target levels for blood pressure reduction or glycaemic control, and only a third of those at high risk and one in six of those at highest risk had attained recommended lipid-level targets.

**Conclusions:** A cardiovascular risk assessment program with strong community support in an urban Aboriginal population can identify a significant number of people with high cardiovascular risk who are candidates for intensive risk-factor reduction strategies.

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National Health and Medical Research Council guidelines for research studies in Aboriginal and Torres Strait Islanders.<sup>2</sup> The Committee for Human Rights at the University of Western Australia approved the study.

### Participants and recruitment

Participants were recruited in the Perth metropolitan area, the majority being Nyoongar people, the traditional land

owners of the region. People identifying themselves as Aboriginal were recruited through health, educational, public service and community institutions, and by family and community contact. (As race is not noted on the electoral rolls, random sampling was not possible.) Publicity for the study was generated through the Derbarl Yerrigan Health Service, workplaces, community organisations, and word of mouth. Community leaders and sporting figures endorsed the campaign, and Aboriginal community radio and newsletters were used to encourage recruitment to the study.

The study was conducted between January 1998 and October 1999.

### Questionnaire

Participants completed a questionnaire modified from the Australian National

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Heart Foundation (NHF) 1989 Risk Factor Prevalence Survey.<sup>3</sup> The questionnaire was self-completed or administered by an Aboriginal healthcare worker, according to the subject's preference.

### Physical assessment and biochemical tests

Health assessments were conducted at Derbarl Yerrigan Health Service, community centres and the Gairdner Campus of the Western Australian Heart Research Institute.

Subjects were weighed in light clothing without shoes, and height was measured against a stadiometer. Girth at the waist and hips were measured at standard anatomical points. The mean of two blood pressure (BP) readings, measured on the right arm after subjects had been seated for 5 minutes, was recorded. Body mass index (BMI) and waist/hip ratio were calculated. Cardiovascular risk categories were determined using both NHF criteria<sup>4</sup> and Sheffield tables.<sup>5</sup>

Plasma lipid and glucose levels were measured on fasting venous blood samples.

A written assessment of cardiovascular risk was sent to each of the participants (and, with their agreement, to their general practitioner), giving recommendations for further action if needed.

### Definitions

The definitions adopted in assessing cardiovascular risk were as follows:

■ **Hypertension:** systolic BP  $\geq 140$  mmHg and/or diastolic BP  $\geq 90$  mmHg, or subject currently receiving treatment for hypertension;<sup>6</sup>

■ **Overweight and obesity:** BMI  $\geq 25$  kg/m<sup>2</sup> and BMI  $\geq 30$  kg/m<sup>2</sup>, respectively.<sup>7</sup>

■ **Excessive waist circumference:**  $\geq 88$  cm (women),  $\geq 102$  cm (men);

■ **Excessive waist/hip ratio:**  $\geq 0.88$  (women),  $\geq 0.95$  (men);<sup>8</sup>

■ **Current smoker:** anyone currently smoking tobacco;

■ **Impaired fasting glucose (IFG):** fasting plasma glucose (FPG) level 6.1–6.9 mmol/L;<sup>9</sup>

■ **Diabetes (provisional diagnosis):** FPG level  $\geq 7$  mmol/L;<sup>9</sup>

■ **Risk of coronary heart disease:** total cholesterol (TC) level  $\geq 5.5$  mmol/L ("increased risk"); TC level  $\geq 6.5$  mmol/L ("very high risk");<sup>4</sup> NHF target treatment level,  $\leq 4.0$  mmol/L.<sup>10</sup>

### Comparisons with national health data

The Australian Institute of Health and Welfare's Cardiovascular risk factors report (hypertension and smoking)<sup>11</sup> and the 1999 Heart, stroke and vascular diseases report<sup>12</sup> (BMI and TC) were used for comparing the PAARS results with statistics for the Australian population as a whole.

## RESULTS

There were 738 study participants (332 men, 406 women); those aged 25–64 years represented about a fifth of the Perth Aboriginal population (determined from 1996 census data) in that age group. The younger participants (18–24 years) comprised <5% of 15–24-year-old Aboriginals in Perth (the census counted those aged 15–24 years). The median age for men was 37 years (range, 18–65 years) and for women, 38 years (range, 18–79 years).

The proportion of study participants who were employed was significantly higher than the proportion in the Perth Aboriginal population as a whole. In the age groups 25–64 years in the PAARS sample, 170/209 (81.3%) men were employed, versus 1398/1912 (73.1%) men in the Perth Aboriginal population, a difference of 8.2 percentage points (95% CI, 2.5–14). Of the women in the PAARS sample, 195/215 (90.7%) were employed compared with 1172/1403 (83.5%) in the Perth Aboriginal population, a difference of 7.2 percentage points (95% CI, 3–11).

**Self-reported risk factors.** The numbers of men and women with a past history of cardiovascular disease and self-reported risk factors are shown in Box 1.

Overall, 46% of men and 44% of women were current smokers, while 17% of men and 16% of women reported that they had quit smoking. Smoking was common among subjects with other cardiovascular risk factors (eg, 38% of those with a history of

### 1: Self-reported cardiovascular history and cardiovascular risk factors in men (n=332) and women (n=406)

Medical history or cardiovascular risk factor	Number of men (%)	Number of women (%)
Angina	32 (10%)	28 (7%)
AMI	16 (5%)	17 (4%)
CVA (stroke)	6 (2%)	6 (1.5%)
Hypertension	90 (27%)	107 (26%)
Diabetes	53 (16%)	77 (19%)
High total cholesterol level	61 (18%)	56 (14%)
Current smoker	152 (46%)	179 (44%)
Family history of CVD	141 (43%)	208 (52%)

AMI = acute myocardial infarction.  
CVA = cerebrovascular accident.  
CVD = cardiovascular disease.

diabetes and 40% with a history of hypertension were smokers).

**Physical examination.** An excessive waist circumference was found in 32% (95% CI, 29%–34%) of men and 61% (95% CI, 59%–63%) of women. An excessive waist/hip ratio was present in 60% (95% CI, 57%–63%) of men and 43% (95% CI, 41%–45%) of women. Comparisons of our data with Australian population data for hypertension, overweight, smoking and hypercholesterolaemia are summarised in Box 2.

**Lipids.** Mean total cholesterol levels were 5.5 mmol/L (95% CI, 5.4–5.6 mmol/L) in men and 5.2 mmol/L (95% CI, 5.1–5.3 mmol/L) in women. In 50% of men and 36% of women, TC level was  $\geq 5.5$  mmol/L, and in 19% of men and 11% of women TC level was  $\geq 6.5$  mmol/L.

The mean high-density lipoprotein (HDL) cholesterol level (for men and women combined) was 1.11 mmol/L (95% CI, 1.18–1.22 mmol/L), the mean low-density lipoprotein (LDL) cholesterol level was 3.3 mmol/L (95% CI, 3.22–3.36 mmol/L), and the mean serum triglyceride level was 2.05 mmol/L (95% CI, 1.91–2.12 mmol/L).

**Hyperglycaemia.** A fasting plasma glucose level provisionally diagnostic for diabetes ( $\geq 7$  mmol/L) was detected in 97/628 participants (15.4%; 95% CI, 14.0%–16.8%). The percentage rose with age, from 4.0% (95% CI, 2.5%–

## 2: Proportion of men and women aged 18–64 with cardiovascular risk factors in the PAARS sample compared with proportion in the general Australian population\*

<b>MEN (n, %, 95% CI)</b>					
<b>Age group</b>	<b>18–24</b>	<b>25–34</b>	<b>35–44</b>	<b>45–54</b>	<b>55–64</b>
<b>Hypertension (blood pressure ≥ 140/90 mmHg)</b>					
PAARS	7/36 (19%) (13%–25%)	30/98 (31%) (26%–36%)	41/101 (41%) (36%–46%)	34/58 (59%) (53%–65%)	17/30 (57%) (48%–66%)
Population	12%	13%	20%	34%	50%
<b>Body mass index ≥ 25 kg/m<sup>2</sup></b>					
PAARS	18/35 (51%) (43%–59%)	74/94 (79%) (75%–83%)	81/95 (85%) (81%–89%)	51/56 (91%) (87%–95%)	23/30 (77%) (70%–84%)
Population	35%	58%	67%	76%	76%
<b>Current smokers</b>					
PAARS	16/37 (43%) (35%–55%)	61/101 (60%) (55%–65%)	45/102 (44%) (39%–49%)	24/61 (39%) (33%–45%)	6/30 (20%) (13%–27%)
Population	32%	34%	30%	26%	22%
<b>Total cholesterol level ≥ 5.5 mmol/L<sup>†</sup></b>					
PAARS	10/28 (36%) (27%–45%)	44/90 (49%) (44%–54%)	49/89 (55%) (50%–60%)	29/55 (53%) (46%–60%)	14/26 (54%) (44%–64%)
Population	18%	32%	53%	67%	60%
<b>WOMEN (n, %, 95% CI)</b>					
<b>Age group</b>	<b>18–24</b>	<b>25–34</b>	<b>35–44</b>	<b>45–54</b>	<b>55–64</b>
<b>Hypertension (blood pressure ≥ 140/90 mmHg)</b>					
PAARS	2/38 (5%) (2%–8%)	15/106 (14%) (11%–17%)	30/121 (25%) (21%–29%)	44/90 (49%) (44%–54%)	18/25 (72%) (63%–81%)
Population	3%	3%	8%	25%	45%
<b>Body mass index ≥ 25 kg/m<sup>2</sup></b>					
PAARS	23/38 (60%) (53%–69%)	72/103 (70%) (65%–75%)	90/119 (76%) (72%–80%)	78/87 (90%) (87%–93%)	24/25 (96%) (92%–100%)
Population	25%	33%	45%	57%	64%
<b>Current smokers</b>					
PAARS	11/38 (29%) (22%–36%)	62/114 (54%) (49%–59%)	60/125 (48%) (43%–53%)	38/96 (40%) (35%–45%)	6/25 (24%) (16%–32%)
Population	28%	28%	21%	18%	16%
<b>Total cholesterol level ≥ 5.5 mmol/L<sup>†</sup></b>					
PAARS	4/33 (12%) (6%–18%)	20/94 (21%) (17%–25%)	41/109 (38%) (34%–42%)	44/82 (54%) (49%–59%)	15/23 (65%) (55%–75%)
Population	17%	32%	31%	51%	66%

\*Population data based on AIHW Cardiovascular risk factors (hypertension and smoking)<sup>11</sup> and the 1999 Heart, Stroke and Vascular Diseases report (body mass index and total cholesterol).<sup>12</sup> †Lipid data available on 288 men and 341 women. PAARS = Perth Aboriginal Atherosclerosis Risk Study.

5.5%) of 18–29-year-olds to 33.0% (95 CI, 28.4%–37.6%) of those over 50. Of 511 participants with no reported history of the disease, diabetes (FPG level ≥ 7 mmol/L) was detected in 19 (3.7%) and IFG (6.1–6.9 mmol/L) in an additional 25 (4.9%), a total of 8.6% (95 CI, 6.2%–11.0%).

**Risk categories.** The proportions of participants falling into the NHF and

Sheffield risk categories are shown in Box 3. Nine per cent of participants were in the “highest risk” NHF category (ie, known vascular disease) and another 74% were in the “high risk” category (ie, at least one coronary risk factor). Only 22% were in the “lower risk” category (ie, no vascular disease or coronary risk factor). In some age groups, nearly 100% of subjects were in

the high or highest risk categories. Using the Sheffield tables of absolute risk, we estimated that 14% of men and 5% of women were at >15% risk of a cardiovascular event within 10 years, and an additional 1% of men and women were at 30% risk of an event within 10 years.

**Proportion of participants within target levels after treatment.** Of the 72 participants on treatment for hypertension, 55 (76%) had a level above the NHF goal of systolic BP <130 mmHg and/or diastolic BP >85 mmHg.

FPG levels were available for 117 of 130 participants who reported a history of diabetes: 78 (67%) had an FPG level ≥7 mmol/L. Of the 22 participants reporting current use of a fibrate (two people) or statin, none had a TC level below the NHF goal of 4 mmol/L. Of the 71 participants with a history of cardiovascular disease, 33 (46%) were current smokers and only two (3%) of the 63 subjects for whom cholesterol levels were available had a TC level <4.0 mmol/L.

## DISCUSSION

Our study identified a large proportion of people in an urban Aboriginal community who have high levels of risk for cardiovascular disease: 83% of participants were at “high” or “highest” risk by NHF criteria.<sup>4</sup> Fifteen per cent of men and 6% of women had an absolute risk >15% of a cardiovascular event within 10 years (ie, a risk level at which pharmacological treatment is recommended).<sup>13</sup> For all risk factors evaluated, a minority of participants had levels that were within the ideal ranges recommended by the NHF.<sup>4,10</sup>

Our study is unique in assessing an urban Australian Aboriginal population. The burden of cardiovascular risk identified is much higher than that in the general Australian urban population and is consistent with observations from remote Aboriginal communities, where rates of risk factors such as overweight and non-insulin dependent diabetes are among the highest in the world.<sup>14</sup> The phenomenon of high levels of diabetes, overweight/obesity and other cardiovascular risk factors, which is common to other indigenous populations, is

### 3: Proportion of men and women in NHF risk categories<sup>4</sup> and Sheffield categories of absolute risk<sup>5</sup> for a cardiovascular event

	Number of men (%)	Number of women (%)
<b>NHF category (332 men, 406 women)</b>		
Lower risk	54 (16%)	71 (17%)
Higher risk	240 (72%)	302 (74%)
Highest risk	38 (11%)	33 (8%)
<b>Sheffield table absolute risk for cardiovascular event* (250 men, 308 women)</b>		
Risk < 15% within 10 years	211 (84%)	290 (94%)
Risk > 15% within 10 years	36 (14%)	15 (5%)
Risk > 30% within 10 years	3 (1%)	3 (1%)

\* Excludes those with known coronary artery disease ( $n=71$ ) and those with missing data for any risk factor needed to calculate risk score. NHF = National Heart Foundation of Australia.

referred to as the “New World” syndrome and is attributed to the effects of urban life.<sup>15</sup>

As the participants in our study were not randomly selected, our data may not be representative of the Australian Aboriginal population as a whole. However, given that the proportion of study participants in employment was higher than that in the overall Perth Aboriginal population, and that cardiovascular risk factors tend to be more prevalent among low-income indigenous communities,<sup>16</sup> the level of risk factors may be even higher in the Perth Aboriginal population as a whole than in our self-selected sample.

The high rates of individual risk factors indicate the need for culturally appropriate, targeted programs to reduce smoking, obesity and diabetes in urban Aboriginal communities. Although public education campaigns and changing community attitudes have led to a decline in smoking in the Australian adult population,<sup>6</sup> they appear to have had minimal impact on this urban Aboriginal community. Similarly, campaigns to enhance awareness of diabetes in the Aboriginal community have not translated into improved control of diabetes, and further resources to achieve this are needed. A high proportion of study participants were found to be at high or very high risk of a cardiovascular event, and the gap between observed and ideal levels of risk was so wide that further programs of risk assessment would appear to be justified. A strong case for screening and case detection for diabetes in the Indigenous Australian

population has already been made,<sup>17</sup> and the data from our study indicate that this approach should be extended to other cardiovascular risk factors. Further research is needed to clarify the reasons for the high prevalence of risk factors and to devise better methods for identifying and treating those at highest risk.

We conclude that a program of cardiovascular risk assessment, with strong Aboriginal community support, can identify a high proportion of urban Aboriginal people who are smokers, hypertensive, dyslipidaemic, overweight, obese or have IFG or diabetes. Many of these people are at a high absolute risk of cardiovascular events and would benefit from intensive programs to reduce risk factors by lifestyle changes and/or pharmacological treatment.<sup>13</sup>

## COMPETING INTERESTS

None identified.

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