Australia’s cholesterol crossroads: An analysis of 199,331 GP patient records

PRELIMINARY RESULTS

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Baker IDI Heart and Diabetes Institute
Preventative Health
75 Commercial Rd
Melbourne VIC 3004

T 1800 670 695
F +61 3 8532 1100
E preventativehealth@bakeridi.edu.au
W www.bakeridi.edu.au

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Introduction

Cardiovascular disease (CVD) is the leading cause of death of adult Australians. It affects close to four million Australians at any one time and accounts for close to 50,000 deaths per annum, with direct costs alone making it the most expensive disease in Australia. It is estimated that almost one in four adults will have developed CVD by 2051.

There are known risk factors for CVD and in Australia it is estimated that one in five CVD-related deaths can be attributed to lipid/cholesterol disorders.

While elevated HDL cholesterol is protective against CVD, elevated LDL cholesterol increases the risk for CVD morbidity and mortality. It is for this reason that the Lipid Management Guidelines in Australia recommend optimal target levels for LDL cholesterol and HDL cholesterol rather than just total cholesterol. The National Heart Foundation of Australia guidelines suggest that high risk individuals, such as those with known heart disease or diabetes, should aim for levels of LDL cholesterol under 2mmol/L and levels of HDL cholesterol higher than 1mmol/L.

This report summarises findings from a contemporary analysis of a large number of cholesterol records derived from primary care in Australia. It has the potential to provide important insights into the optimal monitoring and management of elevated cholesterol in Australia that could assist GPs, health educators and the community to raise awareness about cholesterol and promote the importance of achieving ideal targets to promote heart health.

The data used in this report were provided by Health Communication Network (HCN) which is the leading provider of clinical and practice management software for Australian GPs and Specialists. Over 18,000 GPs and Specialists (85% of GPs using computerised systems) use HCN's Medical Director software to care for their patients during the consultation process.

HCN's research division, General Practice Research Network (GPRN), is a leading electronic provider on the use of medicines in general practice. The GPRN is a national network of Australian GPs and practices who supply anonymous data that is used to support research and development in general practice.

This document contains some initial findings from our project in relation to differentials in cholesterol levels by sex, age and socio-economic region.

The final report containing comprehensive analyses across a broad variety of sub-groups will be available within a few months and will include findings of trends in cholesterol across the latter half of the current decade, geographic variances and lipid-lowering treatment effects.

This report was prepared by:
Dr Melinda Carrington and Professor Simon Stewart from Baker IDI Heart and Diabetes Institute.

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AstraZeneca Pty Ltd
5 Alma Road, North Ryde NSW 2113
ABN: 54 009 682 311
**Cholesterol levels of first patient encounters**

The primary aim of these data analyses was to assess broad trends in cholesterol levels during the time from 2004 to 2009 using available data from the GPRN. Only the first patient record(s) with lipid measurements during this period were selected for analyses. In instances where patients had multiple lipid measurements taken over the course of the 6 years of available data, only their first recorded results were used. Only those individuals aged ≥ 18 years and with basic demographic data (age and sex) were included in data analyses.

The graphs contained in this report summarise the following lipid levels:

- total cholesterol (TC)
- low-density lipoprotein cholesterol (LDL-C)
- high-density lipoprotein cholesterol (HDL-C)

Each of these three variables are presented and compared according to the following sub-groups of interest:

- sex (men vs. women)
- age (middle aged men vs. middle aged women)
- socio-economic status (low income vs. high income area)

*Postcode data were used to infer socio-economic status using median household income (MHHI). MHHI is commonly used to measure the relative prosperity of populations in different geographical locations.*
i) **Sex differences in cholesterol levels**

Overall and as shown in Figure 1, women had higher TC levels than men by a relatively consistent margin of at least 0.10 mmol/L. TC decreased from 2004 to 2009 in both sexes but the change over this period was nearly double for women (0.22 mmol/L) than men (0.12 mmol/L) considering the higher starting point. There was a slight increase in TC levels in 2009 to 5.19 mmol/L for women and 5.07 mmol/L for men. Nevertheless there remained 39% of women and 36% of men who had TC levels above 5.5 mmol/L.

![Figure 1](image1.png)

**Figure 1.** Average TC levels in men and women between 2004 and 2009.

Generally, LDL-C levels between 2004 and 2009 were broadly the same in men and women, except women had higher mean levels in 2004 (Figure 2). Aside from a dip in 2006, LDL-C was relatively unchanged from 2004-2009 in both sexes, remaining close to 3.1 mmol/L. Average levels of LDL seen in both men and women throughout this period are less than ideal. For example, the National Heart Foundation of Australia guidelines suggest that higher risk individuals should aim for levels of LDL cholesterol under 2.0 mmol/L.

![Figure 2](image2.png)

**Figure 2.** Average LDL-C levels in men and women between 2004 and 2009.
As shown in Figure 3, women had consistently higher HDL-C levels than men. Initially, this difference was close to 0.09 mmol/L (in 2004/05) but then fell to 0.03 mmol/L from 2007 onwards. There was an overall decline in mean HDL-C of 0.11 mmol/L for women and 0.05 mmol/L for men from 2004 to 2009. In 2009, HDL-C levels slightly increased to a level of 1.06 mmol/L for women and 1.03 mmol/L for men. HDL-C levels throughout this period were within ideal levels.

Figure 3. Average HDL-C levels in men and women between 2004 and 2009.  
Note: Standard error bars are contained within the data point due to the very small variability.
ii) Sex differences in cholesterol levels of middle-aged adults

Consistent with the overall difference between men and women (of all ages), Figure 4 shows that middle-aged women (45 to 64 years of age) had consistently higher TC levels than middle-aged men. In middle-aged women, TC decreased most rapidly from 2004 to 2005 and then remained approximately at the same level (5.5 mmol/L) until 2009. In middle-aged men, TC levels decreased progressively from 2004 to 2008 before returning to similar levels seen mid-decade by 2009. Whilst the average TC levels recorded for men and women (of all ages) were below 5.5 mmol/L overall, 49% of middle-aged women and 42% of men respectively recorded a TC above 5.5 mmol/L.

Figure 4. Average TC levels in middle-aged men and women between 2004 and 2009.

Middle-aged women had consistently higher LDL-C levels than middle-aged men (Figure 5). Overall, the average LDL-C levels for both sexes is above ideal levels. For both sexes, LDL-C levels dipped in 2006 before increasing to approximately 3.3 mmol/L in 2009. The difference in LDL-C between middle-aged men and women typically ranged from 0.01 to 0.07 mmol/L over this period. Four out of five middle-aged women (82%) and men (79%) had a recorded LDL-C level that exceeds 2.5 mmol/L.

Figure 5. Average LDL-C levels in middle-aged men and women between 2004 and 2009.
Consistent with observed trends for HDL-C levels in men and women of all ages, Figure 6 shows that middle-aged women had higher HDL-C levels than middle-aged men, except in 2006 when they were equal (1.12 mmol/L) for both sexes. From 2004 to 2009, there was an overall decrease in HDL-C of 0.11 mmol/L for middle-aged women and 0.05 mmol/L for middle-aged men whereupon levels increased to 1.07 mmol/L and 1.05 mmol/L respectively. For both sexes, levels of HDL-C met ideal targets.

Figure 6. Average HDL-C levels in middle-aged men and women between 2004 and 2009.
iii) Socio-economic differences in cholesterol levels

Approximately one quarter of patients visited a GP clinic from a low income area (n=42,460) compared to three quarters of visits from a high income area (n=156,871). Figure 7 shows that TC levels in low income areas were marginally higher (0.07 mmol/L) than in high income areas; on an individual level this difference would have little or no clinical impact. A similar number of patients from high and low income areas recorded TC levels over 5.5mmol/L (36% versus 38% respectively).

Figure 7. Average TC levels in low compared to high income areas between 2004 and 2009.

Overall, adults from low income areas had similar LDL-C levels than those from high income areas, with the difference being 0.06 mmol/L (Figure 8). A similar number of patients from low and high income areas recorded LDL-C over 2.5mmol/L (75% versus 74%, respectively).

Figure 8. Average LDL-C levels in low compared to high income areas between 2004 and 2009.
As shown in Figure 9, adults from low income areas had slightly higher HDL-C levels (by 0.04 mmol/L) than those from high income areas.

Figure 9. Average HDL-C levels in low compared to high income areas between 2004 and 2009.
Summary

Overall, mean lipid levels declined in both men and women between 2004 and 2008 before recording a small rise in 2009. These sex-based differences remained constant when adjusting for age, with women recording higher TC and LDL-C levels overall. On the positive side, women recorded higher levels of HDL-C, although this does not fully account for differences in total cholesterol between the sexes.

CVD is the biggest cause of death in Australian women and these data demonstrate that a large proportion of middle-aged women visiting their GP record cholesterol levels above ideal targets. This is a timely reminder, therefore, that middle-aged men and women alike need to have their cholesterol levels checked on a regular basis and work with their GP to lower their levels to reach the ideal target for heart health.

There were limited differences in observed trends according to socio-economic status. Traditionally many may have expected to see increased cholesterol levels in lower socio-economic areas. This was not the case in this analysis, suggesting cholesterol does not discriminate by income.

Further findings and analyses will be available in the very near future.
References

2. The Shifting Burden of Cardiovascular Disease in Australia (2005), prepared for the National Heart Foundation of Australia by Access Economics.