# The National Health Survey 2001: usefulness to inform a discussion on access to and use of quality primary health care using type 2 diabetes mellitus as an example

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## Abstract

**Introduction:** This paper explores the usefulness of the 2001 Australian Bureau of Statistics National Health Survey (2001 NHS) for examining access to and use of quality primary health care (PHC) in Australia, using diabetes as an example.

**Methods:** Potential indicators of access to and use of quality diabetes care were investigated (diagnosis, preventive pharmacotherapy, complication screening, multidisciplinary care and hospitalisation), and their association with various factors including socioeconomic and diabetes-related health status was assessed.

**Results:** Older Australian-born females were more likely to receive preventive pharmacotherapy, whereas complication screening was associated with duration of disease. Multidisciplinary care was associated with recent hospitalisation and not health need assessed by presence of comorbidity.

**Conclusions:** This novel use of the 2001 NHS provided information on patterns of access to and use of diabetes-related PHC that were consistent with previous research. It suggests a new role for survey data in monitoring access to and use of PHC over time and complementing other population health data collections in this area.


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**What is known about the topic?**

Diabetes is an important condition that can be largely managed in the primary health care (PHC) system. The National Health Survey (2001) included diabetes-related questions, but did not assess access to quality PHC for people with diabetes.

**What does this paper add?**

This paper demonstrates the potential of the Australian National Health Survey to address questions relating to access to and use of quality PHC, using diabetes as an example. Differentials were observed in reported preventive pharmacotherapy, complication screening, and multidisciplinary care that did not reflect need as defined by reported diabetes-related health status.

**What are the implications?**

In the absence of a comprehensive PHC data collection system, health surveys could be refined to enhance their usefulness for measuring access to and use of PHC. ◆

IN A PREVIOUS PAPER we proposed a conceptual framework for examining access to and use of quality primary health care (PHC) using population health surveys, and with type 2 diabetes as an example.[1] This enabled us to draw on extensive research evidence, published management guidelines, and the 2005 National Diabetes Strategy Indicator Project to propose a number of domains of care that could be implemented in the

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PHC setting.[2-6] These domains are considered to be consistent with quality care for people with diabetes. Using this approach and despite the limitations of the information that is currently sought, we identified potential indicators of access to and use of quality PHC that were available in the 2001 National Health Survey (2001 NHS) data.[7] The aim of this paper is to present an analysis of these data to explore the utility of this approach. Firstly, we describe the prevalence of type 2 diabetes mellitus and its risk factors, and examine factors associated with increased prevalence. Next we examine indicators of socioeconomic differentials reported by participants; and, finally, we examine those social determinants that are associated with our proposed indicators of access to quality PHC.

## Methods

The 2001 NHS was an Australian population-based survey comprising one randomly selected adult from each of 17 918 private dwellings using multistage area sampling techniques.[7] Our analyses include only participants aged 45 years or more. Participant's responses to two specific questions (Have you ever been told by a doctor or nurse that you have: diabetes? or high sugar levels in your blood or urine? or neither? What type of diabetes were you told you have?) were used to identify participants with type 2 diabetes mellitus.

The 2001 NHS assessed five of seven proposed domains of access to "quality" PHC for people with diabetes:

- *Detection of diabetes and risk factors for diabetes:* based on self-report of diabetes or of risk factors (obesity and physical inactivity)
- *Proactive PHC:* self-report of anti-hypertensive or lipid-lowering medication use (preventive pharmacotherapy)
- *Complication screening:* self-report of an eye check in the last 2 years
- *Multidisciplinary care:* self-report of seeing a general practitioner and a dietitian, podiatrist, or nurse during the last 2 weeks.
- *Hospitalisation:* based on self-report of hospitalisation during the last 12 months.

The first of these domains is used to calculate prevalence in the total sample. Data for the remaining domains, presented for those participants reporting diabetes, are regarded as potential indicators of access to and use of quality PHC. Two domains (prevention of diabetes and monitoring of symptom control) are not included in this paper.[1]

### *Indicators of diabetes-related health and socioeconomic status*

The following socioeconomic factors were assessed: age, sex, country of birth, social marital status, number of adults living in the household, school-leaving age, household income, employment status, welfare receipt (possession of a government health care card), and relative socioeconomic disadvantage.[8] The diabetes risk factors investigated were physical activity, obesity, and smoking status. Diabetes-related health status indicators were duration since diagnosis, interference with daily activities, presence of comorbidity, and cardiovascular disease. Comorbidity was coded as participant report of up to four chronic conditions, or five or more. A diagnosis of cardiovascular disease depended on report of ischaemic heart disease with or without angina, stroke or cerebrovascular accident, and artherosclerosis or peripheral vascular disease.

### *Analysis*

All analyses were undertaken using SAS Software, Release 8.2 (SAS Institute Inc, Cary, NC, USA). Descriptive statistics based on contingency tables and the chi-squared statistics were used to summarise the relationship between the indicators of "quality" PHC and indicators of health and socioeconomic status. We employed multivariate analysis based on logistic regression to calculate the odds (plus 95% confidence intervals) of uptake of each indicator of quality PHC adjusted for age, gender, and country of birth. Further analyses exploring confounding from other covariates did not significantly change the results of logistic regression and are not reported.

All analyses were weighted using calibrated weights provided by the ABS.[7] These weights were designed to align with independent esti-

mates of the population of interest in designated categories of sex by age by area of usual residence, and to the estimated distribution of the Australian population living in private dwellings in non-sparsely populated areas as of 30 June 2001.[7] Significance tests with $P < 0.01$ were regarded as statistically significant unless otherwise noted.

The Human Research Ethics Committee of the University of New South Wales approved the study.

## Results

There were 9472 (weighted estimate) participants aged 45 years or more. Five hundred and seventy two participants (6.0%) were identified as having type 2 diabetes mellitus.

The prevalence of diabetes and of major risk factors for diabetes was associated with measures of socioeconomic status as shown in Box 1. Participants who were older, born in another

**1 Prevalence of type 2 diabetes and risk factors among participants in the 2001 National Health Survey aged 45 years or more ($n = 9472$), stratified by socioeconomic characteristics**

| Characteristic | | *n** | Prevalence of diabetes | Current smoking | Inadequate physical activity | Obesity |
|---|---|---|---|---|---|---|
| Age (years) | 45–64 | 6265 | 4.5§ | 20.9§ | 31.4§ | 19.3§ |
| | 65 + | 3207 | 9.0 | 8.7 | 40.6 | 14.2 |
| Sex | Women | 4569 | 6.1 | 19.4§ | 33.1‡ | 16.6† |
| | Men | 4903 | 6.0 | 14.3 | 35.8 | 18.5 |
| Country of birth | Australia | 6313 | 5.5‡ | 16.5 | 33.5‡ | 17.3 |
| | All other countries | 3159 | 7.1 | 17.4 | 36.5 | 18.1 |
| Marital status | Married | 6625 | 5.8 | 14.8§ | 33.1§ | 18.0 |
| | Not married | 2847 | 6.6 | 21.5 | 37.6 | 16.5 |
| No. of adults in household | 2 or more | 1895 | 5.6 | 20.2§ | 36.0 | 15.2‡ |
| | One | 7577 | 6.2 | 15.9 | 34.1 | 18.2 |
| Age left school | Less than 15 years | 2625 | 8.4§ | 16.6 | 45.1§ | 20.5§ |
| | 15–17 years | 5735 | 5.0 | 17.2 | 31.0 | 16.8 |
| | 18 + years | 1112 | 5.8 | 15.2 | 27.2 | 14.7 |
| Household income | 1 (lowest) | 704 | 8.7§ | 18.8* | 40.5§ | 18.5 |
| | 2 | 1830 | 7.7 | 13.8 | 36.5 | 18.1 |
| | 3 | 1043 | 4.3 | 16.4 | 33.4 | 17.9 |
| | 4 | 1839 | 4.2 | 19.4 | 31.1 | 16.4 |
| | 5 (highest) | 2574 | 4.8 | 13.6 | 22.3 | 17.7 |
| Employment status | Not in workforce | 5174 | 3.3§ | 18.8§ | 31.1§ | 18.3 |
| | Full/part time | 4298 | 8.3 | 15.1 | 37.3 | 17.0 |
| Welfare receipt | No | 4774 | 3.4§ | 17.6* | 30.2§ | 17.5 |
| | Yes | 4698 | 8.8 | 16.0 | 38.8 | 17.6 |
| Relative socioeconomic disadvantage quintile[8] | 1 (most) | 1776 | 8.3§ | 24.2§ | 42.6§ | 19.6§ |
| | 2 | 1864 | 7.2 | 19.2 | 37.3 | 17.8 |
| | 3 | 1777 | 5.9 | 17.3 | 34.1 | 19.6 |
| | 4 | 2052 | 5.2 | 14.3 | 32.9 | 17.4 |
| | 5 (least) | 2002 | 4.0 | 10.0 | 26.4 | 13.8 |
| **Total** | | **9472** | **6.0** | **16.8** | **34.5** | **17.6** |

* Rounded; † $P < 0.05$; ‡ $P < 0.01$; § $P < 0.001$. ◆

country, left school at a young age, reported a low household income or resided in more disadvantaged areas were more likely to report diabetes. Similar trends were also observed for the risk factors for diabetes (physical activity and obesity), with a higher prevalence reported among those who were more disadvantaged, and for current smoking. Women were more likely to report inadequate physical activity and obesity while men were more likely to smoke.

Among participants who reported diabetes ($n$ = 572), health status indicators were also associated with the socioeconomic variables (Box 2). In general, participants who were more disadvantaged

**2 Diabetes-related health status among participants in the 2001 National Health Survey aged 45 years or more with type 2 diabetes mellitus ($n$ = 572), stratified by socioeconomic characteristics**

| | | *n** | Diabetes duration more than 10 years | Diabetes interferes with usual activities | Five or more long-term conditions | Cardio-vascular disease | Hospitalised in last 12 months |
|---|---|---|---|---|---|---|---|
| Age group | 45–64 years | 284 | 49.9 | 83.9‡ | 67.0§ | 8.1§ | 16.0‡ |
| | 65 + years | 289 | 43.2 | 90.8 | 75.6 | 23.5 | 25.2 |
| Sex | Women | 292 | 48.7 | 12.4 | 75.2‡ | 14.4 | 18.8 |
| | Men | 289 | 46.7 | 12.8 | 63.2 | 17.4 | 22.5 |
| Country of birth | Australia | 348 | 43.9† | 10.1† | 78.5§ | 17.4 | 21.9 |
| | Overseas | 225 | 55.6 | 16.5 | 55.2 | 13.5 | 18.5 |
| Marital status | Married | 384 | 49.9 | 12.6 | 64.6§ | 11.9§ | 18.4 |
| | Not married | 189 | 43.2 | 12.5 | 78.8 | 23.9 | 25.2 |
| Number of adults in household | 2 or more | 467 | 48.4 | 12.1 | 67.3† | 13.8‡ | 18.7† |
| | One | 105 | 44.8 | 14.8 | 78.2 | 25.1 | 29.1 |
| Age left school | < 15 years | 219 | 52.2 | 17.2† | 73.7‡ | 19.1 | 19.4 |
| | 15–17 years | 289 | 45.0 | 8.9 | 70.3 | 14.7 | 20.6 |
| | 18 + years | 64 | 44.6 | 13.7 | 50.3 | 9.9 | 24.9 |
| Household income | 1 (lowest) | 182 | 58.8§ | 17.4‡ | 73.7‡ | 20.4§ | 21.5 |
| | 2 | 131 | 52.2 | 11.7 | 76.1 | 26.9 | 24.7 |
| | 3 | 51 | 34.9 | 8.9 | 66.9 | 8.2 | 22.9 |
| | 4 | 46 | 46.9 | 5.1 | 64.9 | 9.6 | 19.1 |
| | 5 (highest) | 69 | 22.0 | 6.1 | 55.7 | 4.5 | 16.5 |
| Employment status | No | 429 | 51.2‡ | 15.4§ | 73.9§ | 19.6§ | 22.6† |
| | Full/part time | 144 | 37.3 | 4.3 | 55.6 | 4.6 | 14.6 |
| Welfare receipt | No | 161 | 35.4§ | 6.0‡ | 54.3§ | 3.6§ | 14.4† |
| | Yes | 411 | 52.6 | 15.2 | 75.2 | 20.7 | 23.0 |
| Relative socioeconomic disadvantage quintile[8] | 1 (most) | 147 | 51.6 | 13.5 | 82.4§ | 18.6† | 22.0 |
| | 2 | 135 | 47.3 | 15.4 | 74.0 | 18.1 | 22.6 |
| | 3 | 104 | 50.6 | 17.6 | 58.6 | 18.1 | 21.4 |
| | 4 | 106 | 42.1 | 8.6 | 68.3 | 11.2 | 21.6 |
| | 5 (least) | 80 | 44.9 | 9.0 | 52.8 | 10.3 | 12.3 |
| Total | | 572 | 47.7 | 12.6 | 69.3 | 15.9 | 20.6 |

* Rounded; † $P < 0.05$; ‡ $P < 0.01$; § $P < 0.001$.

**3 Multivariate analysis* of factors associated with access to and use of "quality" health care for participants in the 2001 National Health Survey aged 45 years of more with type 2 diabetes mellitus, stratified by indicators of socioeconomic and risk status**

| Factors | *n*† | Preventive pharmacotherapy, OR (95% CI) | Multidisciplinary care, OR (95% CI) | Complication screening, OR (95%CI) | Hospitalisation in last 12 months, OR (95% CI) |
|---|---|---|---|---|---|
| Age | | | | | |
| < 65 years | 284 | 1.0 | 1.0 | 1.0 | 1.0 |
| ⩾ 65 years | 289 | 1.62 (1.15–2.27)¶ | 2.08 (0.94–4.64) | 1.86 (1.20–2.89)¶ | 1.83 (1.20–2.79)¶ |
| Sex | | | | | |
| Women | 292 | 1.0 | 1.0 | 1.0 | 1.0 |
| Men | 280 | 0.67 (0.48–0.94)§ | 0.22 (0.09–0.58)¶ | 1.29 (0.84–1.99) | 1.40 (0.92–2.11) |
| Country of birth | | | | | |
| Australia | 348 | 1.0 | 1.0 | 1.0 | 1.0 |
| Other | 225 | 0.58 (0.41–0.82)¶ | 0.39 (0.16–0.98)§ | 0.60 (0.39–0.92)§ | 0.83 (0.54–1.27) |
| Duration of diabetes | | | | | |
| ⩽ 10 years | 299 | 1.0 | 1.0 | 1.0 | 1.0 |
| > 10 years | 273 | 1.24 (0.88–1.74) | 0.76 (0.36–1.60) | 2.00 (1.28–3.13)¶ | 0.96 (0.63–1.45) |
| **Comorbidity** | | | | | |
| Number of long term conditions | | | | | |
| ⩽ 4 | 176 | 1.0 | 1.0 | 1.0 | 1.0 |
| ⩾ 5 | 399 | 2.45 (1.66–3.62)** | 3.32 (0.93–11.89) | 1.23 (0.77 – 1.95) | 2.92 (1.67–5.09)** |
| Cardiovascular disease | | | | | |
| No | 482 | 1.0 | 1.0 | 1.0 | 1.0 |
| Yes | 91 | 2.94 (1.76–4.92)** | 0.98 (0.37–2.64) | 2.38 (1.08–5.23)§ | 3.28 (2.00–5.39)** |
| **Outcome variables** | | | | | |
| Preventive pharmacotherapy | | | | | |
| No | 283 | – | 1.0 | 1.0 | 1.0 |
| Yes | 289 | – | 0.66 (0.31–1.39) | 1.98 (1.27–3.10)¶ | 1.01 (0.67–1.54) |
| Multidisciplinary care | | | | | |
| No | 541 | 1.0 | – | 1.0 | 1.0 |
| Yes | 32 | 0.64 (0.31–1.36) | – | 2.95 (0.71–12.2) | 2.68 (1.23–5.81)¶ |
| Hospitalisation in last 12 months | | | | | |
| No | 455 | 1.0 | 1.0 | 1.0 | – |
| Yes | 118 | 1.01 (0.67–1.54) | 2.82 (1.30–6.13)¶ | 1.13 (0.65–1.97) | – |
| Eye check in the last 12 months | | | | | |
| No | 108 | 1.0 | 1.0 | – | 1.0 |
| Yes | 465 | 1.97 (1.26–3.08)¶ | 2.75 (0.66–11.47) | – | 1.23 (0.65–1.96) |
| **Risk factors** | | | | | |
| Smoking | | | | | |
| Non-smoker | 268 | 1.0 | 1.0 | 1.0 | 1.0 |
| Ex-smoker | 220 | 0.90 (0.61–1.32) | 3.17 (1.42–7.06)¶ | 1.67 (1.0–2.78)§ | 1.43 (0.88–2.30) |
| Current | 84 | 0.55 (0.32–0.94)§ | 0.51 (0.07–3.49) | 1.11 (0.60–2.05) | 1.89 (1.01–3.53)§ |
| Inactivity | | | | | |
| No | 354 | 1.0 | 1.0 | 1.0 | 1.0 |
| Yes | 218 | 1.24 (0.87–1.77) | 4.12 (1.75–9.70)** | 1.04 (0.66–1.63) | 1.19 (0.77–1.83) |
| Obesity | | | | | |
| BMI < 30 | 399 | 1.0 | 1.0 | 1.0 | 1.0 |
| BMI ⩾ 30 | 173 | 1.35 (0.93–1.97) | 0.93 (0.41–2.08) | 0.73 (0.46–1.14) | 1.81 (1.16–2.83)¶ |

**3 (cont.) Multivariate analysis* of factors that associated with access to and use of "quality" primary health care for 2001 NHS participants aged 45 years of more with type 2 diabetes mellitus stratified by indicators of socioeconomic and risk status**

| Factors | N† | Preventive pharmacotherapy, OR (95% CI) | Multidisciplinary care, OR (95% CI) | Complication screening, OR (95%CI) | Hospitalisation in last 12 months, OR (95% CI) |
|---|---|---|---|---|---|
| **Socioeconomic variables** | | | | | |
| Marital status | | | | | |
| Married | 384 | 1.0 | 1.0 | 1.0 | 1.0 |
| Not married | 189 | 0.88 (0.61–1.27) | 1.29 (0.61–2.73) | 0.83 (0.52–1.32) | 1.47 (0.95–2.28) |
| Number of adults in the household | | | | | |
| 2 or more | 467 | 1.0 | 1.0 | 1.0 | 1.0 |
| One | 105 | 0.94 (0.60–1.46) | 0.64 (0.25–1.67) | 1.22 (0.66–2.23) | 1.69 (1.03–2.77)§ |
| Age left school | | | | | |
| < 15 years | 219 | 1.14 (0.63–2.05) | – | 0.63 (0.31–1.30) | 0.62 (0.31–1.24) |
| 15–17 years | 289 | 1.45 (0.80–2.61) | – | 1.07 (0.51–2.23) | 0.72 (0.36–1.41) |
| 18 + years | 64 | 1.0 | – | 1.0 | 1.0 |
| Equivalent income | | | | | |
| 1 (lowest) | 181 | 2.45 (1.56–3.86)** | 1.58 (0.62–4.00) | 1.26 (0.34–2.15) | 1.37 (0.78–2.39) |
| 2 | 131 | 3.71 (2.23–6.17)** | 0.83 (0.27–2.54) | 1.11 (0.61–2.04) | 1.42 (0.79–2.51) |
| 3 | 51 | 4.63 (2.31–9.27)** | 0.26 (0.03–2.58) | 1.52 (0.42–1.56) | 1.47 (0.67–3.22) |
| 4 | 46 | 1.63 (0.82–3.23) | 0.78 (0.14–4.34) | 2.01 (0.78–5.12) | 1.29 (0.55–3.02) |
| 5 (highest) | 69 | 1.0 | 1.0 | 1.0 | 1.0 |
| Employment status | | | | | |
| Not in workforce | 429 | 1.0 | 1.0 | 1.0 | 1.0 |
| Part/full time | 144 | 0.66 (0.43–1.04) | 0.03 (0.001–1.52) | 1.50 (0.87–2.60) | 0.69 (0.38–1.23) |
| Welfare receipt | | | | | |
| No | 161 | 1.0 | –‡ | 1.0 | 1.0 |
| Yes | 411 | 1.31 (0.85–2.01) | | 0.76 (0.45–1.28) | 1.48 (0.83–2.61) |
| Relative/socioeconomic disadvantage quintile[8] | | | | | |
| 1 (least) | 147 | 1.64 (0.92–2.91) | 2.96 (0.67–13.06) | 0.45 (0.19–1.09) | 2.20 (0.99–4.85)§ |
| 2 | 135 | 1.52 (0.86–2.70) | 0.32 (0.04–2.86) | 0.29 (0.12–0.68)¶ | 2.04 (0.93–4.48) |
| 3 | 104 | 1.29 (0.70–2.35) | 1.80 (0.34–9.52) | 0.51 (0.21–1.26) | 2.08 (0.91–4.74) |
| 4 | 106 | 1.17 (0.64–2.14) | 2.02 (0.41–9.92) | 0.43 (0.18–1.05) | 2.06 (0.91–4.69) |
| 5 (most) | 80 | 1.0 | 1.0 | 1.0 | 1.0 |

* Adjusted for age, sex, country of birth, and sample weights. †Rounded. ‡ Only one participant was not a welfare recipient.
§ $P<0.05$. ¶ $P<0.01$. ** $P<0.001$. BMI = Body mass index in kg/m$^2$. ◆

were more likely to report having had diabetes for more than 10 years, that it interfered with their daily activities and that they had chronic disease (cardiovascular disease and more long-term conditions). While older participants did not report longer duration of diabetes they were more likely to report interference with their activities, and chronic disease including cardiovascular disease. Men and women did not differ except that report of long-term conditions was more common among women. Overseas-born participants were more likely to report longer duration and interference with activities, but not chronic disease.

### *Indicators of access to "quality" PHC for diabetes*

Of the four indicators of access to diabetes-related PHC, 50.5% of participants with diabetes reported use of preventive pharmacotherapy (anti-hypertensive, 42.3%; lipid-lowering medication, 21.8%); 81.1% reported complication screening; 5.5% reported multidisciplinary care

(GP, 45.9%; dietitian, 1.2%; podiatrist, 5.4%; nurse, 3.5%); and 20.6% reported hospitalisation (regarded as an indicator of poorer access to quality primary care).

Age was significantly associated with increased reporting of preventive pharmacotherapy (OR, 1.62; 95% CI, 1.15–2.27)), complication screening (OR, 1.86; 95% CI, 1.20–2.89) and hospitalisation (OR, 1.83; 95% CI, 1.20–2.79), but not with multidisciplinary care (OR, 2.08; 95% CI, 0.94–4.64) (Box 3). Male sex was associated with reduced use of preventive pharmacotherapy (OR, 0.67; 95% CI, 0.48–0.94) and multidisciplinary care (OR, 0.22; 95% CI, 0.09–0.58). Overseas birth was associated with reduced report of preventive pharmacotherapy (OR, 0.58; 95% CI, 0.41–0.82), and there was reduced report ($P = 0.05$) of multidisciplinary care (OR, 0.39; 95% CI, 0.16–0.98), and complication screening (OR, 0.60; 95% CI, 0.39–0.92).

Lower household income was significantly associated with increased preventive pharmacotherapy, with those in lower quintiles having increased odds of report of preventive pharmacotherapy (OR, 2.45; 95% CI, 1.56–3.86 [lowest quintile] to OR, 4.63; 95% CI, 2.31–9.27 [middle quintile]) (Box 3). The association between the SEIFA quintile and indicators of quality PHC did not reach statistical significance.

Longer duration of diabetes (> 10 years) was associated with increased odds of complication screening (OR, 2.00; 95% CI, 1.28–3.13). Comorbidity and cardiovascular disease were associated with increased odds of preventive pharmacotherapy (OR, 2.45; 95% CI, 1.66–3.62 and OR, 2.94; 95% CI, 1.76–4.92, respectively), and hospitalisation (OR, 2.92; 95% CI, 1.67–5.09 and OR, 3.28; 95% CI, 2.00–5.39). Associations between comorbidity or cardiovascular disease and complication screening or multidisciplinary care were weak.

Of the risk factors (Box 3), current smoking was associated with reduced preventive pharmacotherapy (OR, 0.55; 95% CI, 0.32–0.94) and increased hospitalisation (OR, 1.89; 95% CI, 1.01–3.53). Ex-smokers were more likely to report multidisciplinary care (OR, 3.17; 95% CI, 1.42–7.06) and complication screening (OR, 1.67; 95% CI, 1.0–2.78). Inactivity was associated with increased multidisciplinary care (OR, 4.12; 95% CI, 1.75–9.70) and obesity with increased hospitalisation (OR, 1.81; 95% CI, 1.16–2.83).

## Discussion

Of the seven potential domains of access to "quality" diabetes-related PHC, we have previously noted[1] that the 2001 NHS contained potential indicators in five of these domains: detection of diabetes and risk factors; proactive care; complication screening; multidisciplinary care; and hospitalisation. This paper is an exploratory study designed to investigate the frequency of report of these indicators and to examine the determinants of report of use of each indicator in these survey data. In particular, we were interested in whether these data could provide information on the determinants of access to and use of quality PHC for people with diabetes.

This discussion is presented in two parts: firstly we discuss the findings and their contribution to understanding of access to and use of quality PHC; and secondly we consider the utility of these data to provide information on access to and use of quality PHC in the absence of an integrated PHC data collection.

### *Access to and use of quality PHC*

Statistically significant relationships were observed in these data between diabetes and diabetes risk factors and indicators of socioeconomic status. These associations are not new and have previously been widely reported.[9-11] That people who are relatively disadvantaged have a greater prevalence of diabetes is important information, especially when this is associated with increased exposure to risk factors for diabetes. Diabetes appears also to have a greater impact on the lives of disadvantaged people, and this is demonstrated in these data by diabetes-related health status indicators. Survey participants were more likely to report a longer duration of diabetes and interference with daily activities if they were relatively disadvantaged. These trends reinforce a recognised need for

targeted strategies to provide appropriate preventive care and early intervention.

About half of participants with diabetes reported using medication for control of cardiovascular risk factors. While it is not possible based on these data to comment on whether this rate of use of these medications is appropriate, there is strong research support for their use to slow progression of the disease.[12-15] The higher rate of use of preventive pharmacotherapy among female and Australian-born participants raises questions about diabetes-related health status. The data suggest little difference in diabetes-related health status between men and women, and therefore equivalent need for pharmacotherapy. Also, overseas-born participants, based on reported duration of diabetes and interference with daily activities, may have the greater need for preventive pharmacotherapy. The tendency for increased use of preventive pharmacotherapy among low income and disadvantaged groups reinforces the importance of the Pharmaceutical Benefits Scheme in providing access to affordable medication. However, this observation may also suggest a tendency to prescribe medication rather than refer to other services or other self-management techniques, as has been observed in previous research.[16,17]

Complication screening was associated with older age and diabetes-related health status, which may indicate a focus on older participants with more established disease rather than early intervention and proactive care. These findings are of concern in light of the research evidence[18,19] and core recommendations of management guidelines[2] that are supportive of proactive care including an annual cycle of screening for complications.

There is interest in hospitalisation related to diabetes because diabetes has been identified as an ambulatory care-sensitive condition, that is, a condition that should not result in hospitalisation if appropriate proactive management strategies are in place, usually in the PHC setting.[20] In these data it was not possible to identify admissions that were specifically related to diabetes, but diabetes is a major contributor to hospitalisation.[21] A fifth of participants reported hospitalisation within the last 12 months. This indicates a need to enhance proactive care in PHC to ensure appropriate care and reduce the risk of poor health outcomes such as hospitalisation. While higher rates of admission for participants with cardiovascular disease and comorbidity were not unreasonable, it was interesting that hospitalisation was not associated with socioeconomic disadvantage, and that hospitalisation did not differ by gender or country of birth. The increased hospitalisation rate for participants who lived alone may highlight a need for alternative interventions to support management at home, particularly for people with poor social support.

Multidisciplinary care coordinated by a GP and drawing on other health professionals, including diabetes educators and nurses, is an accepted strategy with demonstrable benefits through greater patient understanding of diabetes and compliance with management.[5,22,23] Chronic or complex health care programs in Australia have been established to facilitate this.[24,25] Our information on multidisciplinary care was limited to the past 2 weeks and to specific health professionals, consequently some participants who received multidisciplinary care may have been excluded. Nevertheless, the association with being female and Australian-born and recent hospitalisation rather than proactive PHC or the presence of cardiovascular disease seems inconsistent with health care need. This may reflect an inadequate response from the PHC sector in general, and general practice in particular, to implement multidisciplinary care due to the lack of specific remuneration and of practice systems and capacity.[26] It also highlights structural issues within health services that favour patient access to state-funded nursing and allied professionals following hospitalisation.

This analysis has demonstrated variation in access to and use of quality PHC for ongoing management of diabetes. In particular, these data suggest that access to multidisciplinary care, a key component of proactive PHC for chronic health care, is determined not by health care need as suggested by participant report of

diabetes-related health status, but by recent hospitalisation. For other markers of quality there appear to be opportunities for early intervention and proactive diabetes care through targeted, opportunistic approaches to early intervention.

### *Utility of the data*

This is a novel use of these data to address questions relating to access to and use of quality PHC for participants with type 2 diabetes mellitus. The survey and its associated questions were not designed for this purpose and, consequently, limited information on access was sought. This aside, our approach provides insights into the strengths and weaknesses of current care practices relating to diabetes, from which it is possible to draw implications about quality PHC. This approach is consistent with the aims of the 2001 NHS to collect "national benchmarks on a wide range of health issues, and to enable changes in health to be monitored over time" (p. 2).[7] It provides an opportunity to extend the utility of population-based health surveys and increases the benefits of ongoing investment.

The limitations of the 2001 NHS for this purpose need to be acknowledged. Some of these limitations have been noted elsewhere.[9] For example, the data collection is based on self-report of health problems, risk factors and health-related behaviours and did not include biological measures of control of diabetes-related indicators such as $HbA_{1c}$ or awareness of these indictors. Thus, it is not possible to comment on the association of intermediate outcomes such as glycaemia control with access to and use of PHC.[25] There are other design limitations with selected indicators in survey data, and caution in the interpretation of these kinds of data has been recommended.[27] Attempts to validate patient-reported information with general practice clinic records found high specificity and reasonable sensitivity.[28]

We hope that this paper may contribute to a broader debate about the use of these data for this purpose and the development of further survey questions relating to access to and use of quality PHC. There would be clear benefits in further refining the survey questions to allow them to better monitor quality of care in PHC settings and, potentially, to monitor changes over time.

In the absence of a comprehensive PHC data collection, use of population health surveys for these purposes provides another source of information on the range of health services that people use to manage their chronic health care needs. We have also demonstrated that uptake of the components of quality diabetes-related health care varies across population groups defined by a number of measures including health and socioeconomic status. This information could be compared and contrasted with other sources of PHC data such as Health Insurance Commission GP claims[29] or the Bettering the Evaluation and Care of Health (BEACH) program on general practice activity.[30] It may also have use in monitoring the impact of population health interventions, such as GP funding initiatives, over time.[24]

## Conclusion

In recent years, national and state health departments have invested significant resources in developing and conducting general population health surveys, and there is confidence in the ability of these surveys to provide population benchmarks on a range of health-related questions. To support ongoing funding and development of these surveys, it is important that we understand the extent to which they provide, or could be modified to provide, information on other issues such as access to and use of quality health care, particularly in the PHC setting, to monitor population trends over time, and to provide information on participants' perception of health care services and their use. It would be beneficial for those with an interest in monitoring the uptake of population-based chronic disease strategies to meet with survey planners to identify more specific questions on aspects of care without substantial expansion in the

number of questions asked, perhaps through rotation of questions on specific issues over time.

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## Competing interests

The authors declare that they have no competing interests.

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