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Socioeconomic inequalities in utilization of preventive health services in relation to cardiovascular disease and diabetes

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ABSTRACT

Background: Substantial evidence suggests an inverse relation between all-cause mortality and indicators of socioeconomic position (SEP). However, while lower SEP groups are more likely to use medical services due to their increased morbidity, research suggests they are less likely to use preventive health services. National and international research indicates that despite the increasing use of different types of preventive health services, significant SEP-related disparities remain. This study examines the relationship between SEP and the utilization of preventive health services provided by general practitioners (GPs) for cardiovascular disease (CVD) and diabetes in Australia. **Methods:** A self-administered mailed questionnaire survey from 518 participants aged 25-64 years was conducted in Brisbane, Australia, in November 2004. SEP was measured by education and family income levels. Using multivariable analysis, rates of preventive checkups for blood pressure, blood cholesterol (BC) and blood glucose (BG), and for the presence of CVD and/or diabetes were compared by SEP group. **Results:** People from a lower educational background ($P < 0.05$, 95% confidence interval [CI]: 1.11-3.39) and lower income families ($P < 0.05$, 95% CI: 1.26-4.24) were twice as likely to report having CVD and/or diabetes. However, lower income respondents were 2.6 times less likely to have had their BC checked ($P < 0.05$, 95% CI: 0.16-0.89) and those with lower education were half as likely to have had their BC checked ($P < 0.05$, 95% CI: 0.26-0.94). Respondents with a lower education were nearly half as likely to have had their BG checked ($P < 0.05$, 95% CI: 0.28-0.97). **Conclusions:** Some important SEP differences were identified in self-reported utilization of GP preventive health services in relation to CVD and diabetes. Regular checkups for lower SEP groups should be incorporated into GP consultations in primary health care settings.

KEY WORDS: Blood cholesterol checkup, blood glucose checkup, blood pressure checkup, cardiovascular disease, diabetes, socioeconomic position

INTRODUCTION

The links between poor health and socioeconomic disadvantage have been well-described in international and Australian research over the past 40 years. There is a very large body of research demonstrating that higher socioeconomic position (SEP) is associated with better health, and that lower SEP is associated with relatively poorer health [1-8]. For example, in the United States, an approximate doubling of risk of coronary heart disease has been observed in people in the poorest socioeconomic groups compared to those in the richest groups [9]. In addition, in the United Kingdom, a study has shown that death rates at all ages are 2-3 times higher among people in lower social classes than among those in higher classes [10]. Mackenbach *et al.*'s study [11] supports this finding and shows that a higher household income is associated with better self-assessed health in a number of European countries, including Belgium, Denmark, England, Finland, France, The Netherlands, and Norway. Australian research has also demonstrated that socioeconomically disadvantaged individuals experience significantly higher mortality and morbidity rates [12-16], and socioeconomically disadvantaged people present more often with long-term health conditions such as diabetes, diseases of the circulatory system, arthritis and diseases of the ear, compared to less disadvantaged groups [17]. There is also evidence that individuals from lower SEP groups are more likely to engage in health behaviors that contribute to cardiovascular disease (CVD) and diabetes [18]. Death rates from CVD in the most disadvantaged areas of Australia are 21.4% higher than in the least disadvantaged [17]. People aged 25-64 years, living in the most disadvantaged areas, die from CVD at around twice the rate of those living in the least disadvantaged areas [19,20]. Diabetes, a major risk factor for heart disease is also a serious and costly health problem accounting for 5.8% of the overall disease burden in 2003 in Australia [21,22]. Nearly 7750 Australians died from diabetes

and causes related to diabetes accounting for 5.4% of all deaths in 2010 [23]. The proportion of people with diabetes increased as the level of disadvantage increased. People living in areas of most disadvantaged were more likely to have diabetes compared with those living in areas of least disadvantage (6.8% compared with 3.1%) [24].

Evidence from both International and Australian studies that have investigated the relationship between SEP and use of health services generally indicates higher levels of hospital admissions and medical consultations among more disadvantaged groups [25,26]. While a number of studies suggest that lower SEP individuals are more likely to consult medical services due to their increased morbidity, other research suggests that they are less likely to use preventive health services that involve screening and health checks [26-30]. For example, Australian data have shown that socioeconomically disadvantaged individuals report more use of medical services, but less use of preventive health services, such as breast cancer screening and Pap-smear testing, even though they are more likely to suffer a higher burden of disease related to these [1,17]. General practitioners (GPs) in Australia provide a great deal of both primary and secondary preventive care, including screening for diseases and risk factors, vaccination and preventing complications of chronic disease [31]. A universal system of health insurance, Medicare, was introduced into Australia in 1984. Medicare's main function is to cover a large proportion of the cost of services provided by medical practitioners and public hospitals [32]. Under Medicare, all permanent Australian residents are entitled to free public hospital care when admitted to hospital as public patients. Medicare also meets the major proportion of costs of all out-of-hospital medical services, such as GP visits and specialist consultations. Bulk billing is a payment option under the Medicare system and the health service provider is paid 85% of the scheduled fee directly by the government by billing the patient through their Medicare card. However, consultation fees vary between GPs and patients have to contribute a co-payment in some circumstances. Low income earners in Australia are eligible for a Health Care Card, which provides concessions on health care costs including the cost of prescription medicine through the Pharmaceutical Benefits Scheme and medical services funded by the Australian Government. To encourage bulk billing, the Australian Government provides additional incentives for GPs to charge pensioners, Health Care Cardholders and children under 16 no more than the Medicare rebate. Even with a system of universal health coverage, substantial inequalities still exist in Australia in the utilization of GP services for the prevention and management of chronic conditions such as CVD and diabetes [33].

An examination of international research on the relationship between SEP and the utilization of preventive health services suggest that although the use of several different types of these services is increasing, significant disparities remain [34-38]. However, the research undertaken in relation to this issue is still quite limited, particularly in relation to GP screening and secondary prevention of CVD and/or diabetes [39]. The current study examines the relationship between SEP and the utilization of preventive health services provided by GPs for CVD and diabetes among adults in the general population in Australia.

METHODS

Participants

A sample of individuals aged 25-64 years including 393 males and 407 females from the Brisbane area was randomly drawn from the Australian Electoral Roll in 2004. A self-administered mailed questionnaire was used to collect data [40]. The usable response rate was 65%.

Study Measures

The primary outcome of the study was to measure the proportion of people who reported having had their blood pressure (BP), blood cholesterol (BC), or blood glucose (BG) checked by a GP in the 2 and 5 years preceding the time of data collection according to the Guidelines for Preventive Activities in General Practice developed by the Royal Australian College of GP [41]. The participants were asked "When did you last visit a GP or doctor for following: (a) To have your BP checked; (b) to have your BC checked; (c) to have your blood sugar level checked." The six response choices were: In the last 12 months, In the last 2 years, 2-5 years ago, more than 5 years ago, never, and don't know. These three dependent variables were measured as dichotomous variables.

SEP was the main independent variables, which measured on the basis of the respondents' level of education and family income. These two SEP measures were chosen in order to present a stronger picture of socioeconomic disparities in relation to the utilization of preventive health services. Education level (base on highest education attained) was used as a SEP measure because of the likely relationship between education and use of preventive health services [42]. Family income has been often demonstrated to predict the use of different kinds of health services, because it makes available economic resources to allow access to health care services, and makes greater use of preventive health services affordable [43]. The two SEP measures were classified into groups according to their frequency distribution and classification of the Brisbane food study [44] [Table 1].

Participants' demographic information was collected from the survey including age, gender, self-assessed health status, and information on retaining a Health Care Card.

The presence of CVD or diabetes was determined on the participants' reports of at least one CVD - or diabetes-related problem. Based on a preliminary analysis, the frequency distribution of preventive health checkups and SEP variables for both CVD and diabetes were similar. Therefore, we combined CVD and diabetes as one variable, since the number of respondents who reported having diabetes was small. They were measured as dichotomous variables.

Table 1: Sociodemographic characteristics of the study sample

	Number	Percentage
Gender		
Male	219	42.3
Female	299	57.7
Education		
Bachelor degree and higher	178	34.4
Diploma and vocational	132	25.5
Non-post-school qualification	196	37.8
Missing	12	2.3
Household income		
A$52,000 or more	261	50.4
$31.200-51,999	79	15.3
<$31,199	69	13.3
Do not wish to answer	102	19.7
Missing	7	1.4
Self-assessed health status		
Excellent	81	15.6
Very good	200	38.6
Good	166	32.0
Fair	54	10.4
Poor	15	2.9
Missing	2	0.4
Health care card		
Yes	66	12.7
No	449	86.7
Missing	3	0.6

Statistical Analysis

Descriptive analysis of self-reported utilization of GP health services was performed. To explore the relationship between SEP and the use of preventive health services, Chi-square tests were performed at the bivariate level, and at multivariable levels, given the dependent variables as dichotomous variables logistic regression was conducted adjusting for age, gender, and Health Care Card for each outcome variable, respectively. From a preliminary analysis, it was found that age was significantly related to the use of health services. Many previous studies have demonstrated that gender is a factor related to differential use of health services [13,27,29,45-51], and it was hypothesized that Health Care Card might be a factor that impacts on the use of health services. Therefore, these variables were adjusted in the model to reduce confounding bias. The interaction terms between income or education and the presence of CVD and/or diabetes problems were also adjusted for in the model. If a significant result for the interaction effects is obtained, an analysis of simple effects is conducted by looking at the results for each subgroup separately. Therefore, we report the results of logistic regression separately with or without CVD or diabetes. When comparing the three education levels, the highest level of education was used as a reference group, and the high income group was used as a reference group when the three income groups were compared. Odds ratio (OR) and 95% confidence intervals (CIs) were calculated to estimate the relationships. All assumptions were tested before the modeling analysis was performed. SPSS Version 21 [52] was used for the data analysis.

Ethics

Ethical approval was obtained from the Human Research Ethics Committee, Queensland University of Technology before conducting the pre-testing and mailing the survey (QUT Ref. No 3642H).

RESULTS

Sociodemographic Profile of the Participants

Among the usable responses to the mailed survey (N = 518), 219 males and 299 females, 115 of the respondents reported they had CVD, including 39 diabetes and 22 both CVD and diabetes. The average age of the sample was 44 years and nearly 13% of the respondents retained a Health Care Card. Most of the respondents perceived themselves as being in very good health and good health. Overall, 34.4% of respondents reported that they had a higher education qualification, while 37.8% of the respondents reported that they had no post-high school qualification. Over half of the respondents were in the highest income category, while just over 13% of the respondents were in the lowest income category. However, nearly 20% of the respondents did not wish to answer the income question and 1.4% had data missing [Table 1].

Self-reported Utilization of GP Health Services

Of all respondents, 72% reported having visited a GP to have their BP checked in the previous 2 years, 62% having had their BC checked in the previous 5 years, and 59% having had their BG checked in the previous 5 years. For people with CVD or diabetes, 89% reported having visited a GP to have their BP checked, 85% having had their BC checked and 77% having had their BG checked. For people without CVD or diabetes, 67% reported having visited a GP to have their BP checked, 54% having had their BC checked, and 52% having had their BG checked. In total, 4-6% respondents did not answer the question on checkups [Table 2].

SEP and CVD or Diabetes

As shown in Table 3, we can see that respondents from lower educational backgrounds and lower income families were twice as likely to report having CVD and/or diabetes. These relationships are statistically significant for lower education (OR: 1.94; 95% CI: 1.11-3.39) and for lower income (OR: 2.31; 95% CI: 1.26-4.24).

SEP and Utilization of GP Preventive Health Services

As can be seen from Table 4, for people without CVD or diabetes, those from both the low income and low education groups were less likely to report having had BP, BC, or BG checkups compared to the high income or high education groups. Respondents with income <$31,199 were 2.6 times less likely than respondents with incomes of $52, 000 or above to have had their BC checked (95% CI: 0.16-0.89), and those without post-school qualification were two times less likely than those with bachelor degrees and higher to have had their BC checked (95% CI: 0.26-0.94). Respondents without post-school qualifications were nearly half as less likely than those

Table 2: Self-reported health service utilisation of the study sample by SEP and CVD or diabetes

SEP variables		Preventive health services utilization											
		BP checkup, *N* (%)				BC checkup, *N* (%)				BG checkup, *N* (%)			
		Yes	No	Missing	*P* value	Yes	No	Missing	*P* value	Yes	No	Missing	*P* value
CVD or diabetes=Yes	Education												
	Bachelor degree and higher	22 (18.6)	5 (41.7)	0 (0.0)	0.35	21 (18.8)	5 (31.3)	1 (25.0)	0.93	16 (15.7)	11 (45.8)	0 (0.0)	0.04
	Diploma and vocational	35 (29.7)	4 (33.3)	0 (0.0)	(df=6)	34 (30.4)	4 (25.0)	1 (25.0)	(df=6)	32 (31.4)	5 (20.8)	2 (33.3)	(df=6)
	Non-post-school qualification	58 (49.2)	3 (25.0)	2 (100.0)		54 (48.2)	7 (43.8)	2 (12.5)		51 (50.0)	8 (33.3)	4 (66.7)	
	Missing	3 (2.5)	0 (0.0)	0 (0.0)		3 (2.7)	0 (0.0)	0 (0.0)		3 (2.9)	0 (0.0)	0 (0.0)	
	Income (Australian dollars)												
	$52,000 or more	45 (38.1)	6 (50.0)	1 (25.0)	0.78	44 (39.3)	7 (43.8)	1 (25.0)	0.33	40 (39.2)	93 (60.0)	0 (0.0)	0.001
	$31,200-51,999	16 (13.6)	2 (16.7)	1 (25.0)	(df=8)	15 (13.4)	3 (18.8)	1 (25.0)	(df=8)	10 (9.8)	18 (11.6)	3 (50.0)	(df=8)
	<$31,199	26 (22.0)	3 (25.0)	0 (0.0)		23 (20.5)	6 (37.5)	0 (0.0)		24 (23.5)	19 (12.3)	0 (0.0)	
	Do not wish to answer	29 (24.6)	1 (8.3)	0 (0.0)		28 (25.0)	0 (0.0)	2 (50.0)		27 (26.5)	24 (15.5)	2 (33.3)	
	Missing	2 (1.7)	0 (0.0)	0 (0.0)		2 (1.8)	0 (0.0)	0 (0.0)		1 (1.0)	0 (0.0)	1 (16.7)	
CVD or diabetes=No	Education												
	Bachelor degree and higher	92 (37.2)	48 (44.0)	6 (40.0)	0.75	77 (38.5)	59 (39.3)	10 (47.6)	0.06	71 (37.0)	60 (38.7)	15 (62.5)	0.07
	Diploma and vocational	62 (25.1)	25 (22.9)	3 (20.0)	(df=6)	53 (26.5)	34 (22.7)	3 (14.3)	(df=6)	50 (26.0)	35 (22.6)	5 (20.8)	(df=6)
	Non-post-school qualification	85 (34.4)	35 (32.1)	6 (40.0)		63 (31.5)	57 (38.0)	6 (28.6)		64 (33.3)	59 (38.1)	3 (12.5)	
	Missing	8 (3.2)	1 (0.9)	0 (0.0)		7 (3.5)	0 (0.0)	2 (9.5)		7 (3.6)	1 (0.6)	1 (4.2)	
	Income (Australian dollars)												
	$52000 or more	134 (54.3)	66 (60.6)	6 (40.0)	0.24	116 (58.0)	82 (54.7)	8 (38.1)	0.49	103 (53.6)	93 (60.0)	10 (41.7)	0.36
	$31200-51 999	42 (17.0)	11 (10.1)	1 (6.7)	(df=8)	28 (14.0)	21 (14.0)	5 (23.8)	(df=8)	31 (16.1)	18 (11.6)	5 (20.8)	(df=8)
	<$31199	27 (10.9)	10 (9.2)	2 (13.3)		17 (8.5)	20 (13.3)	2 (9.5)		16 (8.3)	19 (12.3)	4 (16.7)	
	Do not wish to answer	41 (16.6)	21 (19.3)	5 (33.3)		36 (18.0)	26 (17.3)	5 (23.8)		39 (20.3)	24 (15.5)	4 (16.7)	
	Missing	3 (1.2)	1 (0.9)	1 (6.7)		3 (1.5)	1 (0.7)	1 (4.8)		3 (1.6)	1 (0.6)	1 (4.2)	
CVD or diabetes=Missing	Education												
	Bachelor degree and higher	1 (10.0)	2 (40.0)	2 (66.7)	0.08	3 (33.3)	1 (25.0)	1 (50.0)	0.95	2 (22.2)	2 (50.0)	2 (100.0)	0.10
	Diploma and vocational	3 (30.0)	0 (0.0)	0 (0.0)	(df=4)	2 (22.2)	1 (25.0)	0 (0.0)	(df=4)	1 (11.1)	1 (25.0)	0 (0.0)	(df=4)
	Non-post-school qualification	6 (60.0)	0 (0.0)	1 (33.3)		4 (44.4)	2 (50.0)	1 (50.0)		6 (66.7)	0 (0.0)	0 (0.0)	
	Income (Australian dollars)												
	$52,000 or more	2 (20.0)	0 (0.0)	1 (33.3)	0.67	1 (11.1)	2 (50.0)	0 (0.0)	0.71	0 (0.0)	2 (50.0)	1 (50.0)	0.36
	$31,200-51,999	3 (30.0)	2 (100.0)	1 (33.3)	(df=6)	4 (44.4)	1 (25.0)	1 (50.0)	(df=6)	4 (44.4)	1 (25.0)	1 (50.0)	(df=6)
	<$31,199	1 (10.0)	0 (0.0)	0 (0.0)		1 (11.1)	0 (0.0)	0 (0.0)		1 (11.1)	0 (0.0)	0 (0.0)	
	Do not wish to answer	4 (40.0)	0 (0.0)	1 (20.0)		3 (33.3)	1 (25.0)	1 (0.0)		4 (44.4)	1 (25.0)	0 (0.0)	
Total	*N*=518 (%)	375 (72.4)	123 (23.7)	20 (3.9)		321 (62.0)	170 (32.8)	27 (5.2)		303 (58.5)	183 (35.3)	32 (6.2)	

SEP: Socioeconomic position, CVD: Cardiovascular disease, BC: Blood cholesterol, BG: Blood glucose, BP: Blood pressure

with bachelor degrees and higher to have had their BG checked (95% CI: 0.28-0.97). Respondents with incomes <$31,199 were 1.8 times less likely than respondents with incomes of $52,000 or above to have had their BG checked. However, the relationship is not significant. The relationships between SEP groups and BP checkup are also not significant.

For people with CVD or diabetes, the multivariable analysis shows that those with incomes between $31,200 and $51,999 were 5.6 times less likely to have a BG check than people with incomes of $52,000 and over (95% CI: 0.04-0.90); those with diplomas and vocational education qualifications were 5.7 times more likely than people with education above bachelor degree level to report having had BG checkups (95% CI: 1.39-23.22). Interactions existed between both income (P = 0.05) and education groups (P = 0.03) and the presence of CVD or diabetes, which impact on the BG checkups. Interactions due to significant differences in BG checkups were found among income groups (P = 0.001) and education groups (P = 0.04) for respondents who report having CVD or diabetes [Table 2]. As can be seen in Table 2, only 10% of respondents with incomes between $31,200 and $51,999 reported having had BG check-ups compared to 40% with incomes of $52,000 and over. Of respondents without post-school qualifications, 50% reported having had their BG checked compared to 31% of respondents with diplomas and vocational education qualifications and 15.7% with bachelor degrees and higher.

Table 3: Logistic regression for multivariable analysis between SEP and CVD or diabetes

Exploratory variables	CVD or diabetes (N=518)			
	OR	95% CI	OR	95%CI
Education				
Bachelor degree and higher	1.00		-	
Diploma and vocational	2.11	1.21–3.68		
Non-post-school qualification	1.94	1.11–3.39		
Income (Australian dollars)				
$52 000 or more	-		1.00	
$31 200–51 999			1.12	0.59–2.15
<$31 199			2.31	1.26–4.24
Do not wish to answer			1.51	0.86–2.67
Age				
	1.07	1.04–1.09	1.07	1.05–1.10
Gender				
Male	1.00		1.00	
Female	0.72	0.46–1.11	0.68	0.440–1.06

OR: Odds ratio, CI: Confidence interval, SEP: Socioeconomic position, CVD: Cardiovascular disease

DISCUSSION

This study identifies some important SEP differences in self-reported utilization of preventive health services provided by Australian GPs in relation to CVD and diabetes. Our findings provide further support to other recent evidence that, even though socioeconomically disadvantaged people are more likely to report having CVD and diabetes [17,18], they still report being less likely to have had a GP checkup, as compared to higher SEP individuals, despite being more frequent users of health services including GP visits.

Each of the socioeconomic groups (income or education) was examined in terms of the key dependent variables of BP, BC, and BG checkups, adjusting for age, sex, Health Care Card with or without CVD and diabetes. The general trend of most of the findings indicates that low SEP groups were less likely than high SEP groups to use preventive health services. In particular, individuals with incomes <$31,199 or without post-school qualifications were less likely than those with incomes of $52,000 and more or bachelor degrees and higher qualifications to use preventive GP health services. These findings are consistent with other international and Australian studies indicating that use of preventive health services is generally correlated with SEP [34-38].

Table 4: Logistic regression for multivariable analysis between SEP and preventive check-ups by CVD or diabetes

Exploratory variables	CVD or Diabetes=No						CVD or Diabetes=Yes					
	BP check-up		BC check-up		BG check-up		BP check-up		BC check-up		BG check-up	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Income (Australian dollars)												
$52 000 or more	1.00		1.00		1.00		1.00		1.00		1.00	
$31 200–51 999	1.43	0.64–3.17	0.70	0.33–1.50	1.44	0.69–2.98	0.65	0.07–5.91	0.42	0.07–2.65	0.18	0.04–0.90
<$31 199	0.84	0.35–2.03	0.38	0.16–0.89	0.57	0.24–1.33	0.63	0.05–7.65	0.24	0.05–1.24	0.62	0.14–2.96
Education												
Bachelor degree and higher	1.00		1.00		1.00		1.00		1.00		1.00	
Diploma and vocational	1.33	0.66–2.66	0.94	0.48–1.83	0.97	0.51–1.85	1.62	0.27–9.92	2.65	0.54–13.1	5.67	1.39–23.22
Non-post-school qualification	0.86	0.45–1.62	0.49	0.26–0.94	0.52	0.28–0.97	17.6	0.35–888.2	1.36	0.24–7.82	4.16	0.89–19.59
Age												
	1.03	1.00–1.06	1.08	1.05–1.11	1.05	1.03–1.08	1.20	1.06–1.36	1.12	1.04–1.21	1.09	1.02–1.16
Gender												
Female	1.00		1.00		1.00		1.00		1.00		1.00	
Male	0.76	0.44–1.31	1.09	0.63–1.87	0.74	0.44–1.26	0.07	0.01–0.69	1.06	0.26–4.35	1.42	0.43–4.66
Health care card												
No	1.00		1.00		1.00		1.00		1.00		1.00	
Yes	3.15	1.12–8.92	1.42	0.61–3.29	1.81	0.79–4.17	0.49	0.01–35.33	4.59	0.29–73.9	2.43	0.21–27.94

OR: Odds ratio, CI: Confidence interval, SEP: Socioeconomic position, CVD: Cardiovascular disease, BP: Blood pressure; BC: Blood cholesterol; BG: Blood glucose

There were significant differences in the effect of CVD or diabetes on BG checkups for income and education. In other words, the effect of income or education differed according to CVD or diabetes status. This suggests a different pattern of use of preventive health services by different SEP groups when CVD or diabetes is present. Interestingly, when CVD or diabetes exists, lower income groups were still less likely to report having had their BP, BC, and BG checked. However, the pattern of preventive checkups differed among education groups. All results show that the lower education group (non-post-school and diploma and vocational qualifications) were more likely to have BC, BG, and BP checkups than those with bachelor degrees and higher qualifications. This is due to the lower education group were more likely to report having CVD and/or diabetes. For respondents without CVD or diabetes, the pattern of results was reasonably consistent when examining respondents' reported level of education or family income as SEP measures in relation to BP, BC, and BG checkups. However, the fact that there were two statistically significant results among education groups, but only one statistically significant result among income groups, could be due to missing data from the lower income group, because almost 20% of respondents did not answer the question in relation to family income.

The relationship between SEP and access to and use of preventive health services is strongly influenced by multiple factors, many of which are beyond the individual level and which occur at the interpersonal, environmental and system levels [2]. Riessman [53] discusses the reasons for the lower utilization of preventive health services by lower SEP groups in the United States and suggests two major explanations. One is the influence on the use of health services by the "culture of poverty," comprising a body of interrelated social, economic and psychological traits that are transmitted from generation to generation. The second explanation relates to economic and socio-structural influences such as the price of services, the availability of health insurance, and family income. Dutton [54] uses similar explanations to those of Riessma, including cost constraints, the culture of poverty, and system barriers. The results of Dutton's study suggest that neither financial resources nor health education will eliminate income differentials in the use of preventive health services, unless accompanied by improvements in delivery systems.

Australian evidence has been reviewed by Furler *et al*. [15] and Achat *et al*. [55], who conclude that the utilization of health services by different socioeconomic groups is mediated and moderated by the following factors: Geographic availability of services, especially in rural and outer urban areas; the cost of health care services, for example, "co-payments" in addition to Medicare and bulk billing; waiting times for publicly funded health services; and a range of specific barriers to disadvantaged groups, including cultural and language barriers. More studies are needed to improve understanding of the determinants of the relationship between SEP and use of preventive health services, particularly in relation to the prevention and management of CVD and diabetes, which collectively contribute to the largest causes of the disease burden in Australia [56].

A number of study limitations need to be considered. It should be noted that preventive health check-ups capture only those who visited their GP for other reasons and then the GP performed opportunistic health checks, which account for most preventive care in general practice [57,58]. Study respondents in the lower income group may also be under-represented in the study analysis, since nearly 20% of the sample did not respond to the question regarding income. In addition, self-reported data on service use may be under-reported [59,60]. Nevertheless, every effort has been made to present and structure the survey questions in a simple and straightforward format. Furthermore, we have conducted pre-testing and pilot studies to refine the survey in an attempt to minimize item non-response and facilitate a good overall response rate [61]. The generalizability of the findings may be limited given the small sample size, and that no relationships were found between SEP and BP checkups and some results were not statistically significant. This may be also due to the manner in which BP screening is conducted by GPs. GPs often check BP during consultations for other health issues, because many campaigns have been conducted and guidelines developed over the last 30 years to encourage GPs to check patients' BP more routinely for earlier detection of CVD-related risk factors such as hypertension [62].

The SEP effects on GPs' preventive health checkups for BC and BG, but not for BP, perhaps suggesting that when BP checkups become more incorporated into standard consultations, the SEP differential will then disappear on the basis of the evidence from the present study, it is proposed that consideration be given to incorporating more regular checkups for lower SEPs during GP consultations. Health inequalities based on SEP can be reduced by improving health system delivery to "automatically benefit individuals irrespective of their own resources or behaviors" [63]. Our finding is consistent with the results of Clark *et al*. [64], who in their review study reported that physicians and other health professionals who opportunistically support risk-factor reduction as a routine part of clinical practice, particularly in adult patients with low SEPs could contribute to a reduction of CVD mortality in this group by over 55% and reduce differences in mortality across socioeconomic groups by 69%.

Reducing social disparities in access to effective primary and secondary prevention treatments and interventions should narrow inequalities in patient outcomes, irrespective of other factors [63,65,66]. It is important for primary care resources to be targeted more directly toward low SEP individuals; for example, to provide additional time for consultations with multidisciplinary team support and to encourage their use of interventions with motivation and peer support [67-70].

CONCLUSION

The findings of the present study suggest that disadvantaged individuals in Australia make less use of GP preventive checkups for CVD and diabetes than the more advantaged. GPs have a critically important role in providing preventive health services for CVD and diabetes to all individuals given that the majority of Australians visit their GP at least annually [58]. However,

there are still challenges: Different strategies are needed to encourage lower SEP individuals to avail themselves of such preventive checkups, and additional support is then required for lifestyle change to reduce the risk of these conditions and/or the progression of complications.

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