SCIENTIFIC CORRESPONDENCE

Utilisation of eye care services by urban and rural Australians

Jill E Keeffe, LeAnn M Weih, Cathy A McCarty, Hugh R Taylor

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Aim: To investigate factors related to the use of eye care services in Australia.
Methods: Health, eye care service use, and sociodemographic data were collected in a structured interview of participants in a population based study. All participants had a standard eye examination.
Results: Men (OR 1.3 CL 1.02, 1.7), those who spoke Greek (OR 2.1 CL 1.1, 3.8) or Italian (OR 1.9 CL 1.0, 3.3), and those without private health insurance (OR 1.59 CL 1.22, 2.04) were more likely to have not used eye care services. Ophthalmology services were utilised at lower rates in rural areas (OR 0.14 CL 0.09, 0.2). Approximately 40% of participants with undercorrected refractive error, cataract, and undiagnosed glaucoma had seen either an ophthalmologist, optometrist, or both within the last year.
Conclusion: Despite the similarity in prevalence of eye disease in urban and rural areas, significant differences exist in the utilisation of eye care services. Sex, private health insurance, urban residence, and the ability to converse in English were significant factors associated with eye healthcare service use. Many participants had undiagnosed eye disease despite having seen an eye care provider in the last year.

There is considerable geographical variability in rates of ophthalmic care in Australia even though prevalence of vision impairment and many eye diseases do not vary geographically and access to eye care is provided for through Medicare.[1 2] Rates of cataract surgery have been found to vary between the Australian states.[3] Although the rate of surgery increased from 16.4 per 1000 to 32 per 1000 over the 10 year period 1984–94, the rate of increase varied between states from 1.5 and 1.7 in Western Australia and New South Wales, respectively, to 2.3 and 2.4 in Victoria and South Australia.[3] Other surgical procedures have varied by up to 2.5 times between and within Australian states.[4] The geographical variation in rates within metropolitan areas did not appear to be associated with the supply of resources, although the high variability suggests the presence of barriers to the access of healthcare services. However, these previous studies did not examine causal explanations for the variation.

The aim of this study is to investigate the relation between eye care service utilisation and sociodemographic and health factors.

Eye care services in Australia are provided mainly by ophthalmologists and optometrists with general practitioners providing some primary care and referring when necessary. Ophthalmology services are available in public hospitals at no cost to patients. Ophthalmologists also consult from private practices where Medicare covers part of the fees. Almost all optometrists are in private practice and Medicare that is available to all Australians covers their fees. Rural areas are well served by optometrists but many have ophthalmologists in larger towns only.

METHOD

The Visual Impairment Project (VIP) was a population based study of the prevalence, causes, and functional consequences of eye disease in adults aged 40 years and older who were living in urban and rural areas of Victoria. A detailed description of the methodology of the VIP is reported elsewhere.[5]

In a structured interview, participants were asked demographic, health, and vision related questions, including if they had noticed a change in their vision in the last 10 years and use of optometry and ophthalmology services. Presenting visual acuity was assessed using a logMAR while the participant wore current spectacles (if used). Subjective refraction was performed where visual acuity was less than 6/6. Visual fields were measured using the Humphrey field analyser (Carl Zeiss, San Leandro, CA, USA).

Healthcare utilisation model

Andersen's model of healthcare utilisation groups variables as predisposing, enabling, or need factors that interact to influence the likelihood of an individual's using healthcare services.[6] *Predisposing* characteristics are those that exist before an illness and describe the propensity of an individual to use healthcare services. *Enabling* factors influence a person's ability to use healthcare services. The *need* for services can be either evaluated as the presence of eye disease or a perceived need, such as "noticed a change in vision." Variables relevant to the utilisation of eye care services in Australia have been inserted into the model to investigate their role in the variation in the utilisation of eye care services (variables listed in Table 1). The outcome measures were defined as ever having seen an ophthalmologist only, ever having seen an optometrist only, or ever having seen both.

Statistical methods

Statistical analyses included χ^2 tests to compare proportions, Mantel-Haensel tests for linear trend, ANOVA comparison of means, and multivariable logistic regression analyses to evaluate the relation with eye care service use. All statistical analyses were performed using SAS version 6.10 (Cary, NC, USA). A p value of less than 0.05 was considered statistically significant.

RESULTS

Participants

Eighty six per cent (4744/5520) of eligible people participated in the study. Thirty one per cent (1473/4744) of participants lived in rural areas, 53% (2530/4744) were women, and the mean age was 59 years (SD 11.8, range 40–103). A total of 65% (3079/4743) of participants were Australian born and 12% (550/4740) spoke a language other than English in their homes. The most commonly spoken languages other than English were Italian, 5% (251/4740), and Greek, 4% (182/4740). The

Table 1 Univariate association of predisposing, enabling, and need characteristics with use of eye care services

		Optometrist only		Ophthalmologist only		Seen both		Never seen eye care provider	
Characteristic	No	% (n)	p value	% (n)	p value	% (n)	p value	% (n)	p value
Predisposing									
Sex:									
Male	2139	46% (976)	0.652,	10% (224)	0.428,	33% (721)	0.093,	11% (218)	0.004,
Female	2473	45% (1112)	χ^2, 1 df=0.204	11% (277)	χ^2, 1 df=0.6	36% (892)	χ^2, 1 df=2.8	8% (192)	χ^2, 1 df=8.3
Country of birth:									
Australia	2999	45% (1357)	0.418,	10% (285)	<0.001,	36% (1077)	<0.001,	9% (280)	<0.013,
NZ/British Isles	440	43% (190)	χ^2,	11% (47)	χ^2,	41% (182)	χ^2,	5% (21)	χ^2,
Europe	319	47% (151)	6 df=6.0	14% (45)	6 df=34.9	32% (102)	6 df=23.7	7% (21)	6 df=16.1
Asia	80	50% (40)		14% (11)		29% (23)		8% (6)	
Greece	272	43% (117)		19% (51)		27% (72)		12% (32)	
Italy	342	49% (168)		9% (342)		30% (104)		11% (36)	
Other	160	40% (65)		17% (28)		33% (53)		9% (14)	
Age:									
40–49 years	1220	44% (532)	<0.001, MH	10% (122)	<0.647, MH	22% (274)	<0.001, MH	24% (292)	<0.001, MH
50–59 years	1313	51% (669)	χ^2,	11% (142)	χ^2,	33% (456)	χ^2,	5% (72)	χ^2,
60–69 years	1157	47% (544)	1 df=58.6	11% (132)	1 df=2.5	39% (456)	1 df=189.0	2% (25)	1 df=474.4
70–79 years	694	41% (283)		11% (75)		46% (322)		2% (14)	
80+ years	228	26% (60)		13% (30)		57% (131)		2% (7)	
Enabling characteristics									
Private insurance:									
Yes	2330	41% (950)	<0.001,	12% (287)	0.002,	39% (929)	<0.001,	7% (164)	<0.001,
No	2259	50% (1125)	χ^2, 1 df=37.7	9% (213)	χ^2, 1 df=9.9	29% (676)	χ^2, 1 df=49.9	11% (245)	χ^2, 1 df=20.4
Language:									
English	4040	45% (1813)	0.207,	10% (415)	0.012,	36% (1454)	0.004,	9% (358)	0.266,
Asian	42	38% (16)	χ^2,	19% (8)	χ^2,	36% (45)	χ^2,	7% (7)	χ^2,
Greek	176	45% (79)	5 df=7.191	18% (31)	5 df=14.7	25% (45)	5 df=17.0	12% (21)	5 df=6.4
Italian	241	49% (119)		12% (29)		30% (73)		8% (20)	
Other European	77	57% (44)		14% (11)		25% (19)		4% (3)	
Other	32	47% (15)		16% (5)		22% (7)		16% (5)	
Education:									
No secondary	2132	47% (994)	<0.001,	11% (232)	<0.001,	35% (746)	<0.001,	8% (160)	0.007,
Secondary	977	45% (440)	χ^2,	11% (112)	χ^2,	33% (320)	χ^2,	11% (105)	χ^2,
Trade	485	54% (260)	3 df=42.0	5% (22)	3 df=29.5	31% (149)	3 df=16.9	11% (54	3 df=12.2
Tertiary	905	37% (332)		14% (127)		40% (364)		9% (82)	
Employment:									
Employed	2023	48% (968)	0.004,	10% (194)	0.018,	29% (588)	<0.001,	13% (273)	<0.001,
Unemployed	77	48% (37)	χ^2,	14% (11)	χ^2,	29% (22)	χ^2,	9% (7)	χ^2,
Home duties	1117	46% (509)	4 df=15.3	10% (113)	4 df=11.9	37% (416)	4 df=67.6	7% (79)	4 df=107.7
Retired	1303	41% (535)		13% (171)		42% (554)		3% (43)	
Other	55	42% (23)		11% (6)		365 (20)		11% (6)	
Residence:									
Urban	3176	39% (1223)	<0.001,	15% (467)	<0.001,	40% (1256)	<0.001,	7% (230)	<0.001,
Rural	1436	60% (865)	χ^2, 1 df=188	2% (34)	χ^2, 1 df=155.4	25% (357)	χ^2, 1 df=93.8	13% (180)	χ^2, 1 df=34.2
Need characteristics									
Diabetes:									
Yes	227	29% (66)	<0.001,	13% (29)	0.356,	56% (126)	<0.001,	3% (6)	<0.001,
No	4364	46% (2011)	χ^2, 1 df=25.2	11% (472)	χ^2, 1 df=0.8	34% (1478)	χ^2, 1 df=44.4	9% (403)	χ^2, 1 df=11.5
Presenting acuity:									
≥6/6	3017	47% (1430)	<0.001,	10% (303)	0.017,	32% (958)	<0.001,	11% (326)	<0.001,
<6/6	1587	41% (655)	χ^2, 1 df=15.7	12% (196)	χ^2, 1 df=5.7	41% (652)	χ^2, 1 df=39.8	5% (84)	χ^2, 1 df=38.9
Noticed a change in vision:									
Yes	3880	46% (1791)	0.03,	11% (425)	0.620,	37% (1451)	<0.001,	5% (213)	<0.001,
No	660	42% (275)	χ^2, 1 df=4.6	10% (68)	χ^2, 1 df=0.25	22% (142)	χ^2, 1 df=62.0	27% (175)	χ^2, 1 df=319.0
Undercorrected refractive error:									
Yes	451	46% (207)	0.779,	12% (55)	0.338,	37% (166)	0.390,	5% (23)	<0.001,
No	4161	45% (1881)	Chisqure, 1 df=0.8	11% (446)	χ^2, 1 df=0.9	35% (1447)	χ^2, 1 df=0.7	9% (387)	χ^2, 1 df=8.9
Family history of eye disease:									
Yes	1121	44% (494)	0.160,	12% (132)	0.055,	38% (426)	0.003,	6% (69)	<0.001,
No	2990	46% (1391)	χ, 1 df=1.97	10% (291)	χ^2, 1 df=3.7	33% (988)	χ^2, 1 df=8.9	11% (320)	χ^2, 1 df=19.7
Eye disease:									
Yes	1495	39% (581)	<0.001,	12% (183)	0.028,	46% (685)	<0.001,	3% (46)	<0.001,
No	3072	49% (1491)	χ^2, 1 df=37.9	10% (310)	χ^2, 1 df=4.8	305 (909)	χ^2, 1 df=115.6	12% (362)	χ^2, 1 df=93.7

Table 2 Multivariate odds ratios for having seen an eye care provider

Variable	Seen both		Optometrist only		Opthalmologist only		Never seen	
	Odds ratio	95% Confidence interval	Odds ratio	95% Confidence interval	Odds ratio	95% Confidence interval	Odds ratio	95% Confidence interval
Residential location								
Urban	1		1				1	
Rural	0.43	0.37 to 0.51	2.59	2.26 to 2.97	0.14	0.09 to 0.20	1.88	1.45 to 2.45
Private insurance								
No	1		1		NS		1	
Yes	1.48	1.28 to 1.70	0.74	0.65 to 0.84			0.63	0.49 to 0.82
Age (years)								
40–49	1		1		1		1	
50–59	1.44	1.18 to 1.74	1.51	1.28 to 1.78	0.90	0.68 to 1.19	0.27	0.20 to 0.36
60–69	2.00	1.64 to 2.44	1.39	1.15 to 1.69	0.99	0.74 to 1.32	0.08	0.05 to 0.13
70–79	3.00	2.38 to 3.76	0.96	0.77 to 1.21	1.32	0.95 to 1.84	0.04	0.02 to 0.09
80+	4.35	3.04 to 6.20	0.50	0.35 to 0.71	1.19	0.71 to 2.01	0.08	0.03 to 0.21
Language								
English	1		1		NS		1	
Asian	1.16	0.56 to 2.40	1.04	0.55 to 1.97			0.45	0.12 to 1.60
Greek	0.42	0.28 to 0.64	1.22	0.89 to 1.68			2.15	1.18 to 3.89
Italian	0.58	0.42 to 0.80	1.58	1.20 to 2.07			1.90	1.08 to 3.32
Other	0.47	0.28 to 0.78	1.75	1.17 to 2.61			0.93	0.41 to 2.10
Diabetes								
No	1		1		NS		NS	
Yes	2.68	1.95 to 3.67	0.45	0.33 to 0.61				
Family history of eye disease								
No	1		NS		1		1	
Yes	1.17	1.01 to 1.37			1.28	1.02 to 1.60	0.59	0.43 to 0.80
Noticed a change in vision								
No	1		NS		NS		1	
Yes	2.25	1.80 to 2.81					0.18	0.14 to 0.24
Sex								
Male	NS		NS		NS		1	
Female							0.77	0.60 to 0.98

NS=not significant.

demographic characteristics of those who did and did not participate were similar with the exception that people who spoke a language other than English were somewhat less likely to participate (87% *v* 78%).

Urban and rural participants were similar with respect to most predisposing and need characteristics but differed on enabling characteristics. Urban participants were more likely to speak a language other than English in their homes (17% *v* 2%) and more likely to have private health insurance (56% *v* 39%).

A majority of participants, 97% (4612/4744), had complete data for use of ophthalmology and optometry eye care services so were included in the analyses. Forty five per cent (2088/4612) of participants had seen only an optometrist, 11% (501/4612) only an ophthalmologist, and 35% (1613/4612) had seen both an optometrist and ophthalmologist. A total of 8.9% (410/4612) had never seen an eye care provider.

Predisposing characteristics

The use of eye care services was strongly age related (Table 1). However, at all ages relatively fewer people have seen an ophthalmologist only. From age 70 years approximately half of the participants had seen both an ophthalmologist and optometrist. Older participants were more likely to have seen both eye care providers (Table 2). There was a significant sex difference for never having seen an eye care provider.

Enabling characteristics

Those with private health insurance were more likely to have seen an ophthalmologist or both an ophthalmologist and optometrist (Table 2). Participants without private health insurance were more likely to have seen an optometrist only. Having private health insurance was associated with a reduced likelihood of never having seen an eye care provider.

People living in rural areas were more likely to have seen only an optometrist (Table 2). Rural participants were almost twice as likely to have never been seen by an eye care provider than their urban counterparts.

People speaking Greek, Italian, or other languages were approximately half as likely to have seen both an ophthalmologist and optometrist (Table 2) and were more likely to have never seen an eye care provider.

Need for eye care services

All but a small percentage of the people with a need to see an eye care provider had done so at least once (Table 1). The presence of a condition that might indicate a need to see an eye care provider was not associated with the likelihood of seeing an optometrist. There was no difference in the frequency with which those with undercorrected refractive error or with a family history of eye disease saw an optometrist (Table 1).

Of the people who had noticed a change in their vision (3880/4540), all but 9% (361/3868) had seen someone about the change. Of those who had not seen someone, 18% (63/361) had visual acuity <6/6 and 11% (41/361) could have visual acuity improved by at least one line by refraction. The more common reasons given by those who did not see someone were that the change was not severe enough (40%), they were too busy (26%), or stated that it was normal for eyesight to deteriorate with age (16%).

Time since last eye care visit

Forty five per cent (2079/4656) of people had seen an eye care provider within the last year, 63% (2920/4656) in the last 2 years, and 81% (3761/4656) within 5 years. Men (OR 0.7, CL 0.59, 0.83), people without a family history of eye disease (OR 0.69, CL 0.56.0.83) or private health insurance (OR 0.66, CL 0.57, 0.78), and people with undercorrected refractive error (OR 0.49, CL 0.37, 0.64) were less likely to have seen an eye care provider in the last 5 years.

Forty three (183/425) per cent of participants with undercorrected refractive error had seen an eye care provider

within the last year, 59% (251/425) within the last 2 years. Within the last year, 63% (116/183) had seen an optometrist only, 28% (51/183) had seen an ophthalmologist only.

People were 1.26 times (CL 1.08, 1.48) more likely to have undiagnosed eye disease (cataract, AMD, or glaucoma) if they had never seen an ophthalmologist and 1.87 times (CL 1.5, 2.3) if they had never seen an optometrist. Twelve people with undiagnosed glaucoma (33%) had seen an ophthalmologist only within the last year, 19 (53%) had seen an optometrist only, and five (14%) had seen both in the last year. Of those with undiagnosed cataract, 60% (12/20) had seen an optometrist only, 20% (4/20) had seen an ophthalmologist only, and 20% (4/20) had seen both in the last year. Seventy per cent of the people with undiagnosed eye disease were aged between 60 and 79.

DISCUSSION

The variation in utilisation of eye care services in Australia can be explained by a combination of the predisposing, enabling, and need characteristics. Andersen's model[6] provides some insights into the factors that create barriers to the use of eye care services. Predisposing or personal attributes were found to be associated with utilisation of eye care services. As expected, utilisation of eye care services increased with age. Sex (male) acted as a barrier to never having been seen but not to who was seen. The enabling (or disabling) factors—private health insurance, rural residence, and language spoken—independently explained some of the variation in utilisation of eye care services. Despite the existence of universal Medicare coverage and ophthalmology clinics in public hospitals, the lack of private health insurance appeared to act as a barrier to the use of medical eye care services.

There was a large difference in utilisation of eye care services between urban and rural residence, even though the overall prevalence of eye disease is similar.[1 2] Differences in patterns of utilisation could be due to availability of eye care services. Most large and medium sized rural towns have at least a part time optometry practice whereas many rural towns do not have an ophthalmologist in practice. The lower utilisation rates in rural areas might explain the higher rate of undiagnosed glaucoma in rural areas than was found in the urban area.[7] Of concern though is the presence of undiagnosed glaucoma in people who have made visits to their eye care practitioners within the last year.

People who had noticed a change in vision or had a known risk factor such as diabetes had utilised eye care services more frequently than those without a perceived or diagnosed risk. However, we found that just under half the people with diabetes have not had the recommended eye examinations needed to detect asymptomatic retinopathy.[8] Despite the finding that awareness of risk factors prompt some people to seek eye care, there were still many who were unaware of the risks.[9–11] The perception that vision loss is a normal consequence of ageing also needs to be countered.

Most Victorians over the age of 40 have seen an eye care provider at least once. The Blue Mountains Eye Study (BMES) reported that only 1% of participants had not used eye care services[12] compared to 8.9% in the VIP. A greater proportion of participants in the BMES had seen an ophthalmologist than in the VIP. These differences might be due to the older age group and the urban fringe location with no rural sample in the BMES. Similarly to the VIP, the BMES found that age and sex (predisposing characteristics) were related to utilisation of eye care practitioners and that "need" factors (eye disease and diabetes) were important determinants. Enabling characteristics were not included in the BMES model of utilisation.

Although the results from this study cannot assess if there is an overutilisation of eye care services, the amount of undercorrected refractive error indicates that there needs to be further encouragement for greater utilisation of eye care services. The undiagnosed eye disease and vision impairment found in Victoria and New South Wales, especially glaucoma,[9 12 13] diabetic retinopathy,[8 10] and undercorrected refractive error[14–16] indicate a need for improved access and greater utilisation of existing eye care services.

CONCLUSION

This study has helped to identify groups that need information, encouragement, or assistance to utilise existing services. The encouragement might come from community education and eye care information to healthcare providers such as general practitioners on the need for referrals. Specific interventions such as screening should target high risk groups such as those with diabetes, a family history of eye disease, and older people.

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Authors' affiliations

J E Keeffe, L M Weih, C A McCarty, H R Taylor, Centre for Eye Research Australia, The University of Melbourne

Correspondence to: Dr J E Keeffe, Centre for Eye Research Australia, The University of Melbourne, Royal Victorian Eye and Ear Hospital, 32 Gisborne Street, East Melbourne 3002, Australia; jillek@unimelb.edu.au

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