

# The British Asian Community Eye Study: Outline of results on the prevalence of eye disease in British Asians with origins from the Indian subcontinent

Abdul Rauf, Rizwan Malik<sup>1</sup>, Catey Bunce<sup>2</sup>, Richard Wormald<sup>2,3</sup>

**Background:** Asians from the Indian Subcontinent form the largest ethnic minority in the United Kingdom. Data on the prevalence of visually-impairing eye conditions in this population are vital for planning eye health care services. **Materials and Methods:** This survey was based in the two London boroughs with the largest Asian populations. Subjects originating from the Indian Subcontinent were identified from GP practice records. All subjects were asked about demographic details and were given a full ophthalmological examination. The severity of cataract, glaucoma, diabetic retinopathy, and age-related maculopathy was recorded. Blindness was defined as logMAR visual acuity of 0.99 (Snellen equivalence 20/200 in the better eye) or worse, 'low vision' was defined as Snellen equivalence of 20/63 or worse (logMAR 0.5 or higher), and visual impairment was defined as visual acuity worse than 20/40. **Results:** The median age was 56 years. Two hundred and eighty four subjects did not attend for eye examination. Of the 922 examined, 128 subjects (13.9%) were 'visually impaired,' 39 (4.2%) had 'low vision,' and 6 (0.7%) were bilaterally blind. The overall prevalence of cataract, open-angle glaucoma, age-related macular degeneration, and diabetic retinopathy were 77%, 1.0%, 8.7%, and 8.8%, respectively. **Conclusion:** Visual impairment rates amongst Asians seem to be similar to Caucasian populations in the UK. The prevalence of cataract and diabetic retinopathy is higher, while the risk of ARMD and OAG are comparable. In view of the high cataract prevalence, a more detailed assessment of the visual profile and factors limiting healthcare accessibility in this community are needed.

**Key words:** British Asians, eye disease prevalence, eye health care planning, Indian subcontinent

Figures from the UK national population census show that people of origins from the Indian subcontinent constitute 4% of the UK population and half of the ethnic minority population of the UK.<sup>[1]</sup> Despite this, data on the prevalence of visual impairment and frequency of eye disease for this community are scarce.

Epidemiological eye surveys in the UK have studied mainly Caucasian white populations.<sup>[2-5]</sup> To date, studies of eye disease prevalence of UK Asians have included only a small number of participants, all with a sample size of less than 200.<sup>[6-9]</sup> This limited data of ophthalmic disease prevalence in British Asians indicates that the rates,<sup>[8,9]</sup> causes of visual impairment,<sup>[10]</sup> and prevalence of commonly disabling eye conditions may be higher in this community compared to the Caucasian white population.<sup>[6,8,9]</sup>

The British Asian Community Eye Study (BACES) was established to quantify the magnitude of eye disease within people with origins the Indian Subcontinent and is the first

community-based study of its kind. This information is critical; both for the purposes of planning eye health care services and for the investigation of causes and risk factors for these common visually disabling conditions.

The aim of the study was to obtain prevalence estimates of visual impairment and the main serious eye disorders, namely cataract, glaucoma, age-related macular degeneration, and diabetic retinopathy, within the British Asian Community. Throughout this article, the term 'Asian' denotes people with origins from the Indian Subcontinent (i.e. India, Pakistan, and Bangladesh).

## Materials and Methods

A cross-sectional population-based study was undertaken of 4 GP practices in London with a high proportion of Asian patients on their register.

The study was undertaken in 1997 and was funded by the Thomas Pocklington Trust. Obtaining a truly representative nationwide sample was infeasible because of massive resource requirements. Therefore, the survey was based in two London boroughs with the largest Asian populations. These were the North London boroughs of Brent and Harrow with an Asian population of 19.2% and the East London borough of Tower Hamlets with a Bangladeshi population of 22.9%.<sup>[11]</sup>

Four GP group practices with high proportion of Asians on their registers agreed to participate in this survey. Two of the practices were not computerized. All practice records were systematically searched. The names and addresses of all subjects born in (or before) 1955 were recorded. All European

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Queens Hospital, Burton-on-Trent, Staffordshire, <sup>1</sup>Glaucoma Research Unit, NIHR Biomedical Research Centre for Ophthalmology at Moorfields Eye Hospital Foundation NHS Trust and UCL Institute of Ophthalmology, <sup>2</sup>Research and Development, Moorfields Eye Hospital, <sup>3</sup>London School of Hygiene and Tropical Medicine, London, UK

**Correspondence to:** Mr. Rizwan Malik, Glaucoma Research Unit, NIHR Biomedical Research Centre for Ophthalmology at Moorfields Eye Hospital Foundation NHS Trust and UCL Institute of Ophthalmology, London, UK. E-mail: rizimalik@googlegmail.com

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names were deleted from the list generated. With the help of practice staff, all subjects with origins from the Indian Subcontinent were identified from this list (usually by name). These were defined as the eligible subjects to participate in the survey.

Subjects were invited to attend the 'survey clinic' to complete a questionnaire detailing social and health characteristics and were invited to attend for a full ocular examination. Ensuring a high response rate was a major priority. This was achieved by local publicity using posters in community centers, places of worship, and with the help of community leaders. Short press releases about the survey appeared in the local council paper, and some Asian weekly newspapers were used to increase awareness of the project and thereby increase the response rate.

Non-responders were sent two further written invitations. Following this, any non-responders after 3 letters received a home visit by a member of the survey team accompanied by a person from the local community. Home visits were also arranged for the genuinely household to enable a detailed examination in the patient's home.

All eligible subjects were sent a letter with information sheet and consent forms in English and in Bengali or Gujarati or Urdu, depending on the initial origin of the subject. The letter explained the purpose of the survey and invited subjects for a screening eye examination at their GP surgery.

On arrival at the survey clinic, all subjects, with the help of a trained interviewer, filled in a short questionnaire, which included questions on demographic characteristics, health, eye health-service use, and any history of major eye disease. This was followed by a full ophthalmologic examination. This included measurement of visual acuity (using Log MAR Acuity Cards, Glasgow Caledonian University). Central 25-degree static threshold screening of visual fields was conducted using the Takagi 75-point static perimeter. Intraocular pressure was measured with the Perkins handheld tonometer. Pupillary dilatation was achieved with 1% tropicamide eye drops. A Slit lamp was used for anterior segment examination, grading of cataract, and indirect ophthalmoscopy.

Best-corrected monocular LogMAR visual acuity was assessed. If visual acuity was less than 20/20, visual acuity was also measured using a pinhole. The number of subjects with visual acuity of less than 20/40 in the better eye ('visual impairment') was documented. In the UK, visual acuity of less than 20/40 (LogMar > 0.3) in the better eye is considered inadequate for driving purposes. 'low vision' was defined as Snellen equivalence of 20/36 or worse (logMAR > 0.5). Blindness was defined as logMAR visual acuity of greater than 0.99, which in Snellen equivalence is less than 20/200 in the better eye. The causes of visual impairment were recorded by cross-tabulating the cause of visual impairment and 'visual acuity of less than 20/40' so that these 2 groups were not mutually exclusive and patients who had two conditions contributing to visual impairment were included in both groups. This allowed a direct comparison of prevalence from the current study with that of a North London Study,<sup>[2]</sup> which represented the largest study of visual impairment in an elderly defined population of a typical metropolitan area in the UK.

Cataracts were classified according to the Lens Opacities Classification Systems III (LOCS III) on slit lamp examination.<sup>[12]</sup> This system uses a set of 6 slit images for grading nuclear opacity (NO) in terms of color and opalescence, 5 retroillumination images for grading cortical cataract (CC) and 5 retroillumination images for grading posterior subcapsular cataract (PSC). Patients who were pseudophakic or aphakic were included in prevalence estimates of cataract. A lens was classified as cataractous if NO was greater or equal to 3 or if CC or PSC score was 2 or greater.

The fundus was examined by clinical assessment using a 90-dioptre lens and a slit lamp and direct ophthalmoscopy whenever necessary. The number of eyes with 1-2 isolated drusen was noted. Only eyes with more than 2 drusen and/or obvious macular pigmentary changes were classified as having ARMD. This is a recognized definition of ARMD.<sup>[13]</sup> In addition, advanced cases of atrophic degeneration disciform ARMD and choroidal neovascular membrane were also included in this latter category.

Diagnostic criteria for Open Angle Glaucoma (OAG) were: Glaucomatous optic nerve damage, presence of glaucomatous visual field defect, and open angle on gonioscopy. Subjects were classified as 'glaucoma suspects' if they had possible glaucomatous optic neuropathy (or cup-disc-ratio) asymmetry of greater than 0.2 in the presence of normal visual fields. In accordance with large epidemiological studies of glaucoma, intraocular pressure (IOP) was not a criterion for diagnosis.<sup>[14-17]</sup> Ocular hypertension (OHT) was diagnosed in cases of raised intraocular pressure (>21 mmHg), and open angles, but no evidence of optic nerve or visual field abnormality. Primary angle closure glaucoma was diagnosed in the presence of closed or narrow drainage angles. Any subjects who were known to have glaucoma were counted as cases and were included in prevalence estimates.

Diabetic retinopathy was graded into the following main groups: (i) background, (ii) maculopathy, (iii) pre-proliferative, and (iv) proliferative.

Any other anterior or posterior segment abnormalities were described individually. Subjects were referred via their GP for further definitive examination if they were identified as having an ocular abnormality requiring treatment or long-term monitoring. For instance, subjects were referred if their IOP was greater than 21 mmHg in either eye; if they had field loss or an abnormal optic disc; if they had diabetic retinopathy or visually-significant cataract. Most of these subjects were referred via their GP to a clinic at Moorfields Eye Hospital, London.

All analyses, unless otherwise stated, were conducted using Stata (Stat 9, Stata Corp LP, Texas). Crude prevalence estimates are presented with 95% confidence intervals computed by the exact Binomial method for normally distributed data. For non-Gaussian data, median and interquartile ranges are presented.

All participants in the survey gave written informed consent in accordance with the Helsinki Declaration and the Moorfields Local Ethics Research Committee approved the study. We certify that all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed during this research.

## Results

The number of subjects identified from the General Practice registers for inclusion in the survey by age and ethnicity was 1206. Of these, 103 had moved away from the area, 3 had died, and 2 patients were in hospital [Fig. 1]. Out of the remaining sample of 1098 patients, 176 did not respond or declined to participate.

At the end of the fieldwork, therefore, 922 subjects were seen in the 4 practices. This constituted 84% of the eligible ( $n = 1098$ ) participants and 76% of the original sample ( $n = 1206$ ).

As patients of Pakistani origin comprised only a small number of the total responding population, patients of Pakistani and Indian origin were collectively classified as 'Non-Bangladeshi.'

In the tables presented in the results, various categories do not all add up to 922. This is due to the fact that some subjects refused to answer all the questions. Such data was labeled as 'missing data.'

For this study, the 176 patients who did not respond to the survey in addition to the 108 who were not contactable were classified as 'non-responders.' The demographic details of the responders and non-responders are shown in Table 1. The sex ( $\chi^2 = 0.99, P = 0.32$ ) and proportion of people of Bangladeshi origin ( $\chi^2 = 2.5, P = 0.11$ ) of the two groups were similar; however, there was some evidence that non-responders were older than responders ( $\chi^2 = 7.0, P = 0.07$ ).

Of the subjects entered into the study, 6% of fundi were

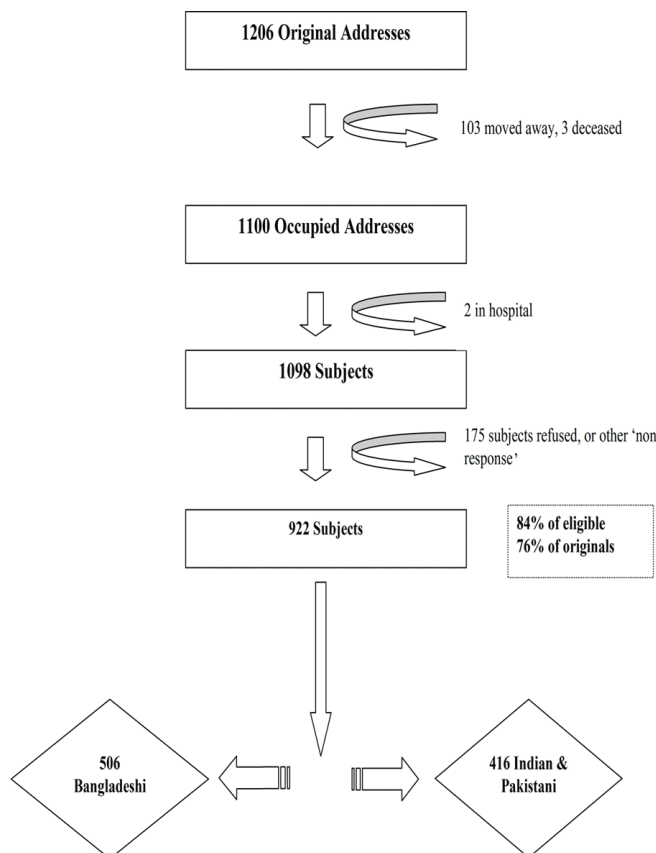


Figure 1: Flow chart showing response by the survey population

not visualized either due to media opacities or due to subjects refusing dilating drops.

The religious affiliations of the responders were: Islam 581 (63%), Hindu 309 (34%), Sikh 16 (2%), other religions 13 (1%) (Missing data on  $n = 3$ ). One third ( $n = 305, 33%$ ) of the responders were educated to college or university level. A large proportion of subjects owned their house or flat ( $n = 403, 45%$ ), whilst 466 (52%) were renting council and private ( $n = 16, 2%$ ) property at the time of the survey (missing data on 34). The median age of participants was 55.8 (Interquartile Range 46.7, 62 years). The median years lived in the UK was 24 years (Interquartile range 15-31 years).

Visual impairment was defined as best corrected vision worse than 20/40. In this survey, 128 subjects (13.9%) had visual acuity, which did not meet this standard (with glasses or pinhole) and were classified as 'visually impaired.'

The overall crude estimate of low vision (defined as visual acuity of 20/63 or worse),  $n = 39$ , in our study population was 4.2% (95% confidence interval 3.0–5.7%). The prevalence rates were similar for the two sexes and exhibited a trend to increase with an increasing age [Table 2].

There were 6 subjects with corrected bilateral visual acuity of counting fingers or worse, giving a 0.7% of blindness prevalence in this population. A further 29 (3.1%) subjects were blind in one eye.

Sixty-four participants (6.9%) could not be adequately assessed for the presence of cataract. The number of subjects with cataract (as defined by our LOCS III criteria) was 651 (70.6%, 95% CI=67.6-73.5), 55 were pseudophakic or aphakic (6.0%, CI = 4.5–7.7%), and 152 were phakic without lens opacity (16.5%, 95% CI = 14.1–19.0). Hence, the total prevalence of cataract in the study population (including pseudophakia/aphakia) in the prevalence estimate was 76.6%.

Table 3 presents the prevalence of glaucoma cases and suspects in the examined community. Three percent of subjects could not be assessed for glaucoma for several reasons; most

Table 1: Characteristics of the survey non-responders versus the responders

		Responders (%)	Non-responders (%)
Sex	Male	462 (50.1)	159 (56.0)
	Female	458 (49.7)	114 (40.1)
	Missing	2 (0.2)	11 (0.9)
	Total	922 (100)	284 (100)
Age (years)	40-49	289 (31.3)	38 (13.4)
	50-59	290 (31.5)	77 (27.1)
	60-69	254 (27.5)	74 (26.1)
	> 69	81 (8.8)	37 (13.0)
	Missing	8 (0.9)	58 (20.4)
	Total	922 (100)	284 (100)
Nationality	Bangladeshi	506 (54.9)	190 (66.9)
	Non-Bangladeshi	414 (44.9)	94 (33.1)
	Missing	2 (0.2)	0 (0)
	Total	922 (100)	284 (100)



**Table 2: Prevalence of partial sight and Blindness in the BACES study**

Study factor	Category	Number of visually impaired (6/19 or worse)	Prevalence estimate (%)	95% CI
Sex	Male	18	3.9	2.3–6.1
	Female	21	4.6	2.9–6.9
Age	40-49	11	3.8	1.9–6.7
	50-59	12	4.1	2.2–7.1
	60-69	10	3.9	1.9–7.1
	>70	6	7.4	2.8–15.4
Origin	Bangladesh	22	4.3	2.7–6.5
	India	15	4.4	2.5–7.1
	Pakistan	1	1.8	0.04–9.7
	Sri-Lanka	0	0	0.0–30.8
	Others	1	14.3	0.3–57.9
Crude estimate		39	4.2	4.1–7.2

**Table 3: Glaucoma prevalence in the BACES study**

	Number of patients	Prevalence estimate %	95 % Confidence interval
No glaucoma	830	90.02	(87.90 %, 91.88 %)
Glaucoma Suspect	38	4.12	(2.93 %, 5.61 %)
Ocular Hypertension	7	0.76	(0.31 %, 1.56 %)
Narrow Angle Glaucoma	2	0.22	(0.03 %, 0.78 %)
Primary Open Angle Glaucoma	9	0.98	(0.45 %, 1.84 %)
Secondary Glaucoma	1	0.11	(0.00 %, 0.60 %)
Could not be assessed	35	3.80	(2.66 %, 5.24 %)

commonly refusal to carry out visual field testing or have drops for IOP measurement. Where both eyes had been given diagnoses, the poorer category was used in tabulating results.

In this survey, 8 subjects (0.9%) were known cases of OAG while a further 2 subjects (2%) had previously diagnosed narrow angle glaucoma. As a result of this study, 43 (4.7%) subjects were referred for further hospital assessment because of one or more of the following abnormalities found in either eye: abnormal fields, asymmetrical discs, or IOP greater than 21 mmHg. We do not have data on the outcome of these referrals since there was no feedback to investigators after referral.

In this survey, there was no case of neovascular or geographic atrophy that could be classified as age-related macular degeneration (ARMD). Of the 922 participants, 71 (7.7%) could not be assessed for the presence of ARMD. These included subjects with dense cataracts and some subjects who refused dilating drops. The prevalence of ARMD was 8.7% (95% CI = 6.9–10.7). Ninety-eight had 2 or less drusen without pigmentary changes at the macula (10.6%, CI = 8.7–12.8).

Overall, 211 (22.9%) of the responders were diabetic. All

subjects had type II, late-onset diabetes mellitus. For the study population, the prevalence of diabetic eye disease was 8.8% ( $n=81$ ). Fourteen of these were noted to have diabetic retinopathy but were not diagnosed as being diabetic at the time of the survey. The overall prevalence of diabetic retinopathy was about 10% in known diabetics, with maculopathy ( $n=11$ , 5.2%) and diabetic retinopathy without maculopathy ( $n=11$ , 5.2%) occurring equally. Due to the nature of the study, all retinopathy classification was according to clinical findings, and the retinal angiography was not thought to be appropriate for this type of study.

## Discussion

The present study adds weight to the finding of other studies that reported high cataract prevalence in UK Asians. The prevalence of cataract in the present study (77%) is far higher than that reported in studies of predominantly white populations. Investigators of the Speedwell Cardiovascular Study documented a cataract prevalence of around 30% in men,<sup>[18]</sup> whilst this figure was 13% in the Framingham Eye Study.<sup>[19]</sup>

The higher prevalence of cataract in the British Asian population is consistent with studies, which have compared both white and Asian UK populations. A GP practice in Leicester examined 86 Asian and 71 white subjects aged 40 years and over and found that cataract was far more prevalent in the Asian population with an earlier age of onset when compared to an age-similar Caucasian population.<sup>[6]</sup> They reported cataract prevalence of 24% for the 40-59 year age group and 73% for the over 60 year age group; respective figures were 0% and 41% for the Caucasian population. Another hospital-based study calculated the 'demand incidence' of cataract to be 1.6 times higher in Indian immigrants than in Caucasians.<sup>[20]</sup> In Singapore, rates of cataract extraction are higher amongst Indians compared to local Malays and Chinese.<sup>[21]</sup> Increased disease risks, different thresholds for seeking surgery, and socio-economic factors have been suggested as possible explanations.

The higher prevalence of cataract may reflect an indigenous risk of Asian population for developing cataract and is supported by the high age-adjusted cataract prevalence estimates in India.<sup>[22,23]</sup>

Reports of ARMD prevalence in UK Asians vary from 3% to 18% [Table 4]. The study by Das *et al.* examined Asians from 2 inner city General Practices in Leicester.<sup>[7]</sup> Age differences may account for the higher rates of ARMD and OAG in their study. Approximately 17% of their examined population was aged 70 or over compared with 9% in the BACES study. Inspection of figures from our study suggests that the overall prevalence of ARMD in British Asians is similar to other UK populations.<sup>[2,5]</sup> The Baltimore Eye Survey reported the overall prevalence of ARMD as 0.32% in individuals aged 70-79 and 2.9% in individuals aged 80 and over.<sup>[24]</sup>

The population prevalence of OAG of nearly 1% is also in reasonable agreement with figures from studies of Caucasian white populations in the UK<sup>[2,4]</sup> and elsewhere in the West.<sup>[14,19]</sup> However, we only reported the prevalence of known cases of the disease. It is likely that at least as many cases were subsequently confirmed though these patients were not followed-up after referral.

The crude prevalence of low vision (visual acuity of 20/63

**Table 4: Studies of prevalence of eye disease in UK Asians compared with results of the current (BACES) study**

Study	Location	Sample, n	Age distribution	Eye disease prevalence (%)			
				Cataract	ARMD	DR	OAG
Das <i>et al.</i> <sup>[6]</sup>	Leicester	165	>40 years mean ≈ 57 years	52	17.8	23	4.2
Gray <sup>[8]</sup>	Tower Hamlets, London	167	68-89 years	53	3	9.6	0.6
Rauf <i>et al.</i> <sup>[9]</sup>	Southall, London	184	30-80+ years, mean ≈ 59 years	58	3.8	NA	2.7
BACES	London N & W	922	Median 59 years	77	8.7	8.8	1.0

OAG: Open angle glaucoma, ARMD: Age related macular degeneration, DR: Diabetic retinopathy

or worse in the better eye) in the present study was found to be 4.2% (95% confidence interval 4.1–7.2%). Fourteen percent had visual acuity of less than 20/40 in the better eye. A North London study, which examined a predominantly (94%) white Caucasian population, found the prevalence bilateral visual impairment (visual acuity of less than 20/40) to be 30%.<sup>[2]</sup> The rates of unocular blindness of 3.1% and bilateral blindness of 0.7% are lower than that found by smaller studies of the Asian population in the UK. Reiddy *et al.* assessed functional visual acuity with each person wearing his or her own spectacles and did not use pinhole acuity so this may hamper a direct comparison of visual impairment rates across the 2 studies.<sup>[2]</sup>

In a small study of UK Asians, Rauf *et al.* found unocular blindness of 9.8% and bilateral blindness of 2.7%.<sup>[9]</sup> In UK white populations, Wormald *et al.* found that 7.7% had visual acuity of less than 20/60 in the better eye and 1% were bilaterally blind (worse than 20/400 in both eyes).<sup>[3]</sup>

Table 5 compares the causes of visual impairment from the BACES study with the North London Eye Study.<sup>[2]</sup> This study found considerably less bilateral visual impairment than the North London Eye Study. This difference may, in part, be related to due to age differences. The prevalence of visual impairment caused by ARMD in the 2 populations is comparable.

Surprisingly, despite a high prevalence of cataract in the current study, the prevalence of visual impairment caused by cataract was less than that documented for the North London study. From a public health and service planning perspective, the number of individuals requiring surgery would be most valuable. However, it is not possible to extrapolate the proportion of participants who would be eligible for cataract surgery from these estimates: A high proportion of patients listed for cataract surgery have a visual acuity of 20/40 or better,<sup>[25,26]</sup> and monocular visual acuity is often a poor indicator of visual impairment caused by cataract.<sup>[27]</sup>

This study used the LOCS III system for grading lens opacity with direct clinical comparison to standard photographs. The single observer (AR) was experienced in this technique and had been validated in previous studies using the same grading system.<sup>[28]</sup> However, resources were not available for lens photography and subsequent independent lens grading.

Given that cataract appears to be highly prevalent in the UK Asian population, a more detailed assessment of the visual profile of this population, in terms of subjective

**Table 5: Comparison of prevalence and causes of visual impairment in the BACES study and the North London Study**

Category	BACES (95% CI)	North london study (95% CI)
Overall Prevalence of *visual impairment	13.8 (11.7, 16.3)	30.2 (24.8–35.5)
Prevalence of visual impairment and cataract	9.8 (7.9–11.9)	30 (25.1–35.3)
Prevalence of visual impairment and OAG	0.54 (0.18–1.3)	3 (2.3–3.6)
Prevalence of visual impairment and ARMD	2.1 ( 1.2-3.2)	8 (5.8–10.8)

\*Visual Impairment defined as visual acuity of less than 6/12 in the worse eye.

OAG: Open angle glaucoma, ARMD: Age related macular degeneration

quality of life impairment, is needed. Evaluation of factors, which may limit access to healthcare services, will also be invaluable for the future planning of services as previous studies of UK populations indicate that a large proportion of visual impairment may be remediable through appropriate intervention.<sup>[2,8]</sup>

The BACES is the first study of its kind to provide population estimates of eye disease prevalence in UK Asian population on a reasonably large scale. The sample size of this study is more than 4-5 times than that of previous studies that have examined Asian populations in the UK. The 84% response rate of the BACES study and detailed demographic information regarding the non-responders are strengths of the current study.

The Asian population examined in this survey consisted of participants from different countries: Mainly Pakistan, India, and Bangladesh. It is not known whether eye disease prevalence is uniform across these groups. Our data suggests that the prevalence of visual impairment may be higher in the Bangladeshi community, but our sample size is limited to look specifically at prevalence for individual groups. The prevalence estimates from one study of elderly Bengali residents in Tower Hamlets are fairly consistent with overall crude figures from the current study,<sup>[8]</sup> Table 4.

In this study, people of Asian origin were identified by name. Those with Western sounding names were excluded from the study. Although this methodology is consistent with that used by others for similar studies,<sup>[7]</sup> it is not foolproof. A

small number of Indian immigrants have Christian names and would be missed. However, Asian names are fairly reliable indicators for ascribing Asian ethnic identity in English populations.<sup>[29]</sup>

## References

1. UK Census 2001. Office for National Statistics. Source: National Statistics website. Available from: <http://www.statistics.gov.uk>. [Last accessed on 2011 Mar 1].
2. Reidy A, Minassian DC, Vafidis G, Joseph J, Farrow S, Wu J, *et al*. Prevalence of serious eye disease and visual impairment in a north London population: Population based, cross sectional study. *BMJ* 1998;316:1643-6.
3. Wormald RP, Wright P, Coutney P, Beaumont B, Haines AP. Visual problems in the elderly population and implications for services. *BMJ* 1992;304:1226-9.
4. Coffey M, Reidy A, Wormald R, Xian WX, Wright L, Courtney P. Prevalence of glaucoma in the west of Ireland. *Br J Ophthalmol* 1993;77:17-21.
5. Owen CG, Fletcher AE, Donoghue M, Rudnicka AR. How big is the burden of visual loss caused by age related macular degeneration in the United Kingdom? *Br J Ophthalmol* 2003;87:312-7.
6. Das BN, Thompson JR, Patel R, Rosenthal AR. The prevalence of age related cataract in the Asian community in Leicester: A community based study. *Eye (Lond)* 1990;4(Pt 5):723-6.
7. Das BN, Thompson JR, Patel R, Rosenthal AR. The prevalence of eye disease in Leicester: A comparison of adults of Asian and European descent. *J R Soc Med* 1994;87:219-22.
8. Gray PJ. The prevalence of eye disease in elderly Bengalis in Tower Hamlets. *J R Soc Med* 1994;87:219-22.
9. Rauf A, Ong PS, Pearson RV, Wormald RP. A pilot study into the prevalence of ophthalmic disease in the Indian population of Southall. *J R Soc Med* 1994;87:78-9.
10. Pardhan S, Mahomed I. The clinical characteristics of Asian and Caucasian patients on Bradford's low vision register. *Eye (Lond)* 2002;16:572-6.
11. UK Census 1991. Office for National Statistics. Source: National Statistics website. Available from: <http://www.statistics.gov.uk>. [Last accessed on 1997 Jul 1].
12. Chylack LT Jr, Wolfe JK, Singer DM, Leske MC, Bullimore MA, Bailey IL, *et al*. The Lens Opacities Classification System III. The Longitudinal Study of Cataract Study Group. *Arch Ophthalmol* 1993;111:831-6.
13. The Age-Related Eye Disease Research Group. A randomized, placebo-controlled, clinical trial of high-dose supplementation with vitamins C and E, beta carotene, and zinc for age-related cataract and vision loss. AREDS report no. 9. *Arch Ophthalmol* 2001;119:1439-52.
14. Tielsch JM, Sommer A, Katz J, Royall RM, Quigley HA, Javitt J. Racial variations in the prevalence of primary open-angle glaucoma. *JAMA* 1991;266:369-74.
15. Leske MC, Connell AM, Schachat AP, Hyman L. The Barbados Eye Study. Prevalence of open angle glaucoma. *Arch Ophthalmol* 1994;112:821-9.
16. Sommer A, Tielsch JM, Katz J, Quigley HA, Gottsch JD, Javitt J, *et al*. Relationship between intraocular pressure and primary open angle glaucoma among white and black Americans: The Baltimore Eye Survey. *Arch Ophthalmol* 1991;109:1090-5.
17. Mitchell P, Smith W, Attebo K, Healey PR. Prevalence of open-angle glaucoma in Australia: The Blue Mountains Eye Study. *Ophthalmology* 1996;103:1661-9.
18. Stocks N, Patel R, Sparrow J, Davey-Smith G. Prevalence of cataract in the Speedwell Cardiovascular Study: A cross-sectional survey of men aged 65-83. *Eye (Lond)* 2002;16:275-80.
19. Kahn HA, Liebowitz HM, Ganley JP, Kini MM, Colton T, Nickerson RS, *et al*. The Framingham Eye Study I: Outline and major prevalence findings. *Am J Epidemiol* 1977;106:17-32.
20. Thompson JR. The demand incidence of cataract in Asian immigrants to Britain and their descendants. *Br J Ophthalmol* 1989;73:950-4.
21. Wong TY. Cataract extraction rates among Chinese, Malays and Indians in Singapore: A population-based analysis. *Arch Ophthalmol* 2001;119:727-32.
22. Nirmalan PK, Krishnadas R, Ramakrishnan R, Thulasiraj RD, Katz J, Tielsch JM, *et al*. Lens opacities in a rural population of southern India: The Aravind Comprehensive Eye Study. *Invest Ophthalmol Vis Sci* 2003;44:4639-43.
23. Chatterjee A, Milton RC, Thyle S. Prevalence and aetiology of cataract in Punjab. *Br J Ophthalmol* 1982;66:35-42.
24. Rahmani B, Tielsch JM, Katz J, Gottsch J, Quigley H, Javitt J, *et al*. The cause-specific prevalence of visual impairment in an urban population: The Baltimore Eye Survey. *Ophthalmology* 1996;103:1721-6.
25. Desai P, Reidy A, Minassian DC. Profile of patients presenting for cataract surgery in the UK: National data collection. *Br J Ophthalmol* 1999;83:893-6.
26. Malik R, Frost NA, Sparrow JM, Hale L. The Bristol cataract listing survey: Profile of patients with visual acuity 6/12 or better. *Eye (Lond)* 2005;19:406-10.
27. Brown NA. The morphology of cataract and visual performance. *Eye (Lond)* 1993;7:63-7.
28. Evans JR, Rauf A, Aihie Sayer A, Wormald RP, Cooper C. Age-related nuclear lens opacities are associated with reduced growth before 1 year of age. *Invest Ophthalmol Vis Sci* 1998;39:1740-4.
29. Nicoll A, Bassett K, Ulijaszek JS. What's in a name? Accuracy of using surnames and forenames in ascribing Asian ethnic identity in English populations. *J Epidemiol Community Health* 1986;40:364-8.

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