

Oman Eye Study 2005: prevalence and determinants of glaucoma

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دراسة حول أمراض العيون في سلطنة عُمان في عام 2005: معدلات انتشار الزَّرَق ومحدداته

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الخلاصة: أجرى الباحثون هذه الدراسة المجتمعية لتقدير معدل انتشار الزَّرَق، وللتعرُّف على محدداته بين السكان في سلطنة عُمان في عامي 2005 و2006. وقد شارك في المسح المقيمون في 75 منزلاً تم تقسيمها عشوائياً إلى 25 مجموعة. وقام الباحثون بفحص 3324 فرداً في سن الثلاثين فما فوق، وإجراء لقاءات معهم في منازلهم وفي عيادات العيون لتدوين التفاصيل الشخصية، ووضع الزَّرَق لديهم، ووجود عوامل اختطار معينة؛ وتم تشخيص الزَّرَق لدى 180 شخصاً. وكان المعدل المتوقع لانتشار الزَّرَق بين السكان في السلطنة في سن الثلاثين فما فوق 4.75%. ومثلت أنواع الزَّرَق المفتوح الزاوية والزَّرَق بانغلاق الزاوية 40.6% و37.8% على التوالي. وكانت سوابق الإصابة بفرط الضغط سلبية، أما ارتباط الزَّرَق بتقدُّم السن، وسوابق الإصابة بالزَّرَق في الأسرة فكان إيجابياً.

ABSTRACT This community-based study was carried out to estimate the prevalence and identify the determinants of glaucoma in the Omani population in 2005–06. Residents of 75 randomly selected houses in 25 clusters participated in the survey. We interviewed and examined 3324 individuals aged ≥ 30 years in their homes and in eye clinics to note personal details, glaucoma status and presence of selected risk factors: 180 were diagnosed as having glaucoma. Projected prevalence of glaucoma among the Omani population ≥ 30 years was 4.75%. Open angle and angle closure types of glaucoma contributed 40.6% and 37.8% respectively. History of hypertension was negatively, and older age and family history of glaucoma were positively, associated with glaucoma.

Étude sur l'œil réalisée à Oman en 2005 : prévalence et déterminants du glaucome

RÉSUMÉ Cette étude en population générale a été réalisée dans le but d'estimer la prévalence et d'identifier les déterminants du glaucome dans la population omanaise en 2005-2006. Les personnes vivant dans 75 habitations choisies de façon aléatoire parmi 25 grappes ont participé à l'enquête. Nous avons interrogé et examiné 3324 sujets âgés de 30 ans ou plus à leur domicile et dans des cliniques ophtalmologiques afin d'enregistrer leurs informations personnelles, leur état du point de vue du glaucome et la présence de certains facteurs de risque. Le diagnostic de glaucome a été établi pour 180 de ces sujets. D'après les projections, la prévalence du glaucome parmi la population omanaise âgée de 30 ans ou plus était de 4,75 %. Les types de glaucome à angle ouvert et à angle fermé représentaient respectivement 40,6 % et 37,8 % du total. Le glaucome était négativement associé aux antécédents d'hypertension et positivement associé à l'âge avancé et aux antécédents familiaux de glaucome.

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Introduction

Glaucoma is a group of diseases, principally optic neuropathy, that result in vision loss and blindness. It is usually due to intra-ocular pressure being higher than what the ocular tissues can tolerate. The condition is irreversible. Since interventions are available to halt or retard the natural progress of the disease to blindness, with early intervention having greater benefits than late intervention, glaucoma is of great importance from the public health perspective. Unfortunately, in most cases glaucoma is asymptomatic and hence difficult to detect in the early stages.

A highly sensitive surveillance system focusing on the high-risk population could help national prevention of blindness programmes [1]. To establish such a system, evidence-based information on glaucoma is needed. The World Health Organization has recommended its member countries adopt a programme approach by adding glaucoma as a priority disease within their national VISION 2020 plans [2].

Nearly 10% of blindness in Oman in 1996 was due to glaucoma [3]. Therefore, in the 6th 5-year health plan, Oman strengthened secondary/tertiary eye care services to address glaucoma [4,5]. The exact magnitude of glaucoma was, however, not known at that time. Hence the national eye health care committee conducted a national community-based survey targeting the Omani population ≥ 30 years old in 2005 [6]. We present part of this study, focusing on prevalence, risk factors and coverage of existing eye care services to address the problem of glaucoma. The findings will be used in proposing public health policies.

Methods

The National Ethical and Research Committee of Oman approved this community-based cross-sectional study. Health administrators provided written consent. The field investigators obtained verbal consent from each participant.

Assuming prevalence of glaucoma was 4%, and using the 2003 estimates for the Omani population as reference, 444 830 Omani nationals aged ≥ 30 years comprised our study population. A study with 95% confidence and 80% precision in the prevalence estimation (range 3%–5%) would require a randomly collected sample of 3294 individuals. To compensate for the non-participation, the sample was enlarged by a factor of 1.2. Thus, the minimum sample size for the proposed survey was 3700 Omani citizens.

All the Ministry of Health Institutions and their catchment area population according to 2003 population estimates were listed. The households in the catchment area of a primary health centre were then calculated using an average of 5 family members per house. Using 75 households as 1 unit, the number of units per centre was estimated as a measure for random selection; clusters with < 75 houses were combined. We randomly selected 25 of 4950 clusters using *Microsoft Excel* software random selection function. In the selected locations, households were visited in sequential order using a prominent landmark, e.g. main mosque, school, grocery shop, as a starting point. This was continued until the required sample was enrolled. Each house was visited twice in the week of the survey. Those absent in the first visit were covered

the second time or at another time that was convenient.

The survey was conducted in 2 phases during September 2005–January 2006. Phase I, the field survey, was carried out in participants' homes; Phase II was carried out in the eye units of regional hospitals within 15 days of the Phase I examination. Ophthalmologists, regional eye health care staff and community support group members who had experience in conducting community-based surveys comprised the study investigators.

Personal information such as age, sex, area of residence, history of diabetes, hypertension, medical treatment of glaucoma, surgery for glaucoma in the past, family history of glaucoma (a family member taking treatment or diagnosed as suffering from glaucoma), ocular trauma, and use of steroid medication were collected through interview using closed questions. History of systemic disease was self-reported, however, for those referred for detailed examination in hospital, histories were verified from the case records in the computer.

Vision for each eye was tested with visual aids: Snellen's illiterate 'E' chart held at 6 m distance was used; for any participant who could not read the top letter, the chart was placed at 3 m distance and visual status of the eye was reevaluated. The perception of projected light rays in 4 quadrants was tested for any eye with vision < 6/60. The ophthalmologists examined eyes under relatively low illumination conditions. The anterior segment was examined with the help of well-focused torchlight. The eye was anesthetized using 0.5% novocaine eye drops. Ocular pressure of each eye was measured using a hand-held unit: TonoPen XL (Medtronic, Jacksonville, Florida). Using the direct ophthalmoscope, central retinal details were noted. A depiction of the optic disc and surrounding area was drawn

especially to study the cup:disc (C:D) ratio in the horizontal and vertical directions, arrangement of blood vessels, haemorrhage on and around the disc, etc. Abnormal signs were also noted for each eye separately.

Anyone using anti-glaucoma treatment or who had been operated on for glaucoma in the past in either eye was classed as suffering from glaucoma. If ocular pressure was ≥ 22 mmHg and/or the disc changes were suggestive of glaucoma (C:D ratio ≥ 0.5 , haemorrhage on or near the disc, thinning of neuro-retinal rim, presence of nerve fibre layer defect, overpass phenomena or notching of blood vessels at optic cup margin), we considered the person having risk factors of glaucoma and we labelled him/her as a glaucoma suspect.

The ophthalmologist in the field team reviewed case records and inspected the eye drops of patients to ensure that they contained anti-glaucoma medicines. Both confirmed and suspected cases were referred to the ophthalmologist in Phase II where they were further investigated to confirm the status of each eye.

Refractionists checked the visual status of each eye for distance with the best visual correction (with visual aids or by performing subjective correction). We used automated perimeter (Humphrey) to test the field of vision. In 2 hospitals, Goldman perimeter was used to find glaucomatous field changes. If diagnosis of field of vision by Goldman perimetry was doubtful, it was repeated in the same institution using automated perimeter. Ocular pressure was measured using an applanation tonometer attached to the slit lamp biomicroscope. Gonioscopy was performed using a Goldman single mirror contact lens: the angle of the anterior chamber was graded by the Van Herrick method in all 4 quadrants. If > 2 quadrants had the same grade, the eye was labelled as having that grade of angle. In a person with

glaucoma and having angle grade 0, 1 or 2 in at least 2 quadrants, the eye was labelled as having angle closure glaucoma; if the eye had ≥ 2 quadrants angle grade 3 or 4, it was labelled as having open angle glaucoma. Pseudoexfoliative flakes on the lens or iris or in the angle of the anterior chamber were also noted.

The pupil was dilated using 1.0% tropicamide, 1 drop in each eye, repeated after 20 minutes if required. A detailed fundus examination was performed using non-contact fundus examination (+90D) Volk lens. The biomicroscope was also used for this purpose. The ophthalmologists also used the indirect ophthalmoscope and a +20D lens for stereoscopic assessment of the optic disc. A sketch of the optic disc and the surrounding area of the retina was drawn and changes suggestive of glaucoma were noted.

Based on the history, clinical examination and special investigations, the ophthalmologist concluded the glaucoma status of each eye. Each participant was classified as: known case of glaucoma, diagnosed as glaucoma for the first time, ocular hypertension, no glaucoma or glaucoma suspect who needed further investigation for confirmation.

Based on the findings of Phase I and Phase II, we labelled an eye, and then the person, as having or not having glaucoma. For this purpose we used glaucomatous field changes noted on automated perimetry and optic nerve changes examined using the biomicroscope. Although ocular pressure was used for systematic reference to eye clinics for detailed examination, it was not used to define glaucoma status of an eye.

A pilot study was conducted in a hospital separate from those used in the study to assess the specificity and sensitivity of ocular pressure measurement using a hand held TonoPen and applanation tonometer mounted on a biomicroscope.

The study methods and data collection forms were also tested on 86 individuals in a village (Al Amerat) which was not part of the study. The results suggested the agreement rate of measuring ocular pressure by TonoPen and applanation tonometer was $> 80\%$ and variation of ocular pressure by 2 methods was < 2 mmHg. We also assessed the inter-observer variation of diagnosis of glaucoma by 3 doctors in Phase I in 2 houses of each cluster. The senior ophthalmologist's findings were considered the gold standard. Variation was $< 5\%$.

During the field study, the TonoPen was calibrated daily. To ensure the quality of Phase I of the survey, senior ophthalmologists re-examined residents of 2 randomly selected houses to compare the findings for ocular pressure, visual acuity and retinal and optic disc assessment. The agreement rates were 80%, 92% and 85% respectively.

A standardization workshop was held for all field staff prior to the field part of survey to ensure uniform procedures in different regions. Standardized and pre-tested definitions were used to collect information on ocular conditions.

A panel of 3 ophthalmologists reviewed all available information on the participants who were referred to Phase II and determined the glaucoma status of each person. Considering the fundus and field changes recorded in both phases, each eye was first labelled as suffering from glaucoma (either eye), not having glaucoma or findings not conclusive. Field changes like Ronnie's step, arcuate scotoma, Bjerrum's paracentral scotomas and tubular field of vision were considered as glaucomatous field changes.

We divided the study sample into 2 regional subgroups. Group A included Muscat, Dhofar and Dhahira regions; these have had a well-developed eye care for the past 3 decades. Group B included Dhakhiliya,

North Sharqiya, South Sharqiya, North Batinah, South Batinah, Musundam and Al Wousta regions; these have had developing eye care services only for the past decade.

A central team visited the regions at the end of the survey to audit the forms. No corrections were made. Two persons separately compiled the survey data from each form. They tested the format for data entry before the study and entered the data after the field part was completed. For this *Epi-Data*, version 2 was used. The data were analysed using *SPSS*, version 9, and parametric univariate analysis was carried out. Frequencies, rates with 95% confidence interval (CI), estimated numbers in population and adjusted prevalence were calculated. As adjustment was carried out for the smallest possible unit (2 sex \times 5 age group \times 10 region = 100 small units), while analysing the prevalence of glaucoma we did not adjust for clusters. The sum of the projected glaucoma cases was then divided by the total population \geq 30 years to give the age-, sex- and area-adjusted prevalence rate. The risk factors were associated with glaucoma by calculating relative risk with 95% CI and chi-squared values. We also conducted binary logistic regression analysis to identify the predictors of glaucoma.

Presence of glaucoma was the dependent variable. Age, sex, regional group, history of diabetes, history of hypertension, family history of glaucoma as independent variables were inserted using the step-in method. We also calculated the coverage of glaucoma services: No. of persons operated on for glaucoma/No. of glaucoma cases \times 100.

The persons diagnosed with eye disease during the survey were treated free of charge. The study results were used to improve the eye care of glaucoma patients.

Results

The demographic profile of the Omani population \geq 30 years old was compared with the examined sample (Table 1). Study investigators visited 2026 houses and recorded 4182 residents within the specified age group: 3324 (79.5%) participated in the survey; 689 (16.5%) were absent; and 170 (4.1%) refused to participate. The average participation rate in clusters was 79.4% (range 70%–92%). Ophthalmologists suspected glaucoma in 1 of the eyes of 403 persons (9.6%); 321 (79.7%) suspect cases visited the eye department. Of the 403

Table 1 Age distribution of the population of Oman and the glaucoma study sample aged \geq 30 years according to sex, 2005–06

Age (years)	Males			Females		
	Total <i>n</i>	Examined No.	%	Total <i>n</i>	Examined No.	%
30–39	83 447	311	0.37	80 174	678	0.85
40–49	53 183	288	0.54	57 324	564	0.98
50–59	36 341	269	0.74	36 878	400	1.08
60–69	27 647	266	0.96	22 804	271	1.19
70+	19 614	155	0.79	18 934	122	0.64
Total	220 231	1 289	0.59	216 114	2 035	0.94

suspected cases referred for Phase II, 82 did not turn up in the eye clinic. On repeat examination at home, 27 were assessed as blind with absolute glaucoma, 36 were confirmed as cases of glaucoma, 9 were declared normal and for 10 glaucoma status was undetermined. The mean age of those having glaucoma was 58.12 (standard deviation 12.07) years.

Frequency, age- and sex-adjusted prevalence rates, 95% CI and estimated number of glaucoma cases in the population are

shown in Table 2. Projected prevalence in the Omani population aged ≥ 30 years was 4.75% (95% CI: 4.02–5.47). The rates were adjusted for age and area but not for clustering. Therefore, around 20 700 cases of glaucoma were projected for this age group in Oman.

Of the 180 cases of glaucoma, 68 (37.8%) had angle closure glaucoma (grade 0, I, or II) in ≥ 1 eye, while 73 (40.6%) had open angle glaucoma (grade III or IV); 9 (5.0%) had absolute glaucoma and 7 (3.9%) had

Table 2 Glaucoma in the Omani population aged ≥ 30 years

Variable	Examined No.	With glaucoma No.	With glaucoma %	Adjusted prevalence ^a %	95% CI	Glaucoma cases ^b No.
<i>Sex</i>						
Male	1 289	91	7.06	5.07	3.87–6.27	11 168
Female	2 035	89	4.37	4.41	3.52–5.31	9 537
<i>Age (years)</i>						
30–39	989	15	1.52	1.20	0.51–1.86	1 943
40–49	852	23	2.70	3.20	1.99–4.34	3 500
50–59	669	37	5.53	5.70	3.93–7.44	4 161
60–69	537	62	11.55	11.70	8.99–14.43	5 906
70+	277	43	15.52	13.50	9.45–17.50	5 195
<i>Region, group A</i>						
Muscat	970	41	4.22	3.41	2.27–4.56	3 625
Dhofar	240	6	2.50	2.08	0.27–3.88	850
Dhahira	178	6	3.37	3.20	0.62–5.79	1 166
Total A	1 388	53	3.81	3.45	2.49–4.40	5 641
<i>Region, group B</i>						
Dhakhiliya	310	14	4.50	5.33	2.84–7.83	3 031
N Sharqiya	165	11	6.63	6.39	2.67–10.11	1 995
S Sharqiya	423	28	6.62	4.87	2.82–6.92	1 977
N Batinah	649	46	7.09	5.98	4.15–7.80	5 349
S Batinah	286	11	3.85	3.73	1.54–5.93	1 949
Musundam	57	3	5.26	2.54	–1.55–6.62	147
Al Wousta	46	4	8.70	13.91	3.91–23.91	637
Total B	1 936	127	6.00	5.53	4.52–6.55	15 065
<i>Total Oman</i>	<i>3 324</i>	<i>180</i>	<i>5.42</i>	<i>4.75</i>	<i>4.02–5.47</i>	<i>20 705</i>

^aAge and sex adjusted.

^bProjected number in the population based on the survey results.

CI = confidence interval.

lens-induced glaucoma. In 23 participants (12.8%) the type of glaucoma could not be determined due to opaque media. In 30 (16.7%) of those with glaucoma, 1 eye had pseudo-exfoliative material. In 13.0% of cases, gonioscopy was not possible.

Visual status as presented among confirmed glaucoma cases, suspected glaucoma cases and those without glaucoma is given in Table 3. Risk of poor vision was significantly higher among patients with glaucoma or suspected glaucoma compared to those without glaucoma. ($\chi^2 = 128.8$; $df = 3$; $P < 0.0001$). However, 28% of persons with glaucoma had visual acuity better than 6/18 in the better eye.

Regression analysis suggested that older age and positive family history of glaucoma were predictors of glaucoma (Table 4). Presence of hypertension appeared to be protective against glaucoma.

Of 180 glaucoma cases, 84 (47.8%) already knew that they had the condition: 31 (17.2%) were using eye drops for treatment and 46 (25.6%) had undergone surgery in the past. Thus coverage by eye care services was $77/180 \times 100 = 42.8\%$. If we assume that all glaucoma cases should be operated on, then coverage by surgical services was $46/180 \times 100 = 25.6\%$.

Discussion

Few countries have conducted glaucoma prevalence studies at a national level. In spite of the challenges and limitations of conducting such surveys, results could be used to plan resources, lay down policies for eye care of glaucoma patients and monitor the progress for glaucoma control initiatives.

The prevalence of glaucoma was 4.75% (95% CI: 4.02–5.47) among the Omani population ≥ 30 years of age. This was on a par with the findings of the Los Angeles Latino Eye Study [7] but was higher than in community-based glaucoma surveys in Mongolia and southern India [8,9]. It is estimated that around 20 700 people aged ≥ 30 years could be suffering from glaucoma in Oman at the time of survey. If all doubtful cases are considered as having glaucoma, prevalence could be as high as 7.5%. The magnitude of glaucoma is of public health importance and therefore would be a matter of concern for the health planners of Oman. Glaucoma causes irreversible visual disability but patients could continue living with residual vision. As the life expectancy of an Omani national is 72–74 years [10] and the mean age of our glaucoma patients

Table 3 Vision among individuals in Oman aged ≥ 30 years with glaucoma and without glaucoma

Vision in better eye	Glaucoma confirmed ($n = 180$)		Glaucoma suspected ($n = 85$)		No glaucoma ($n = 3059$)	
	No.	%	No.	%	No.	%
> 6/18	50	27.8	51	60.0	2018	66.0
6/18–6/60	66	36.7	26	30.6	802	26.2
< 6/60–3/60	22	12.2	4	4.7	87	2.8
< 3/60	42	23.3	4	4.7	140	4.6
Undetermined	–	–	–	–	12	0.4

Table 4 Regression analysis showing relationship between glaucoma and selected known risk factors in the Omani population aged ≥ 30 years

Risk factor	Adjusted OR	95% CI	P-value
Age	1.05	1.04–1.07	< 0.001
Sex			
Male	1.30	0.95–1.79	0.10
Female	1	–	
Region			
Group A	0.79	0.57–1.09	0.15
Group B	1	–	
Family history of glaucoma			
Yes	1	–	
No	0.27	0.14–0.52	0.0001
History of diabetes			
Yes	0.76	0.51–1.13	0.18
No	1	–	
History of hypertension			
Yes	0.58	0.41–0.82	0.002
No	1	–	

OR = odds ratio; CI = confidence interval.

was 15 years younger than that, the average person with glaucoma would live with the condition for around 15 years. These patients will need follow-up, medication for controlling ocular pressure and frequent surgeries. If special clinics are not established within ophthalmic units, individuals with glaucoma may not get due attention in routine ophthalmology clinics and their visual disabilities could worsen.

Risk of glaucoma did not differ among males and females. In contrast, males had significantly higher risk than females in a study conducted in Andhra Pradesh, India [11]. In a study that covered angle closure glaucoma, female preponderance was also reported in a Japanese study [12]. In our study, since the proportion of angle closure

glaucoma was low, perhaps the sex difference was not marked.

Regional variation in prevalence of glaucoma in our study was significant. Regions in group A had had better facilities for a decade and thus had better instruments and manpower to screen and manage glaucoma cases, their glaucoma case management is likely to be better compared to the regions in group B which have poorer facilities. This could be one of the reasons for the variation in glaucoma rates we observed in these groups.

As presentation as well as mode of treatment may differ according to type, information about type of glaucoma is very important. In the black population of Northern America as well as in the African population, open angle glaucoma is very common [13]. In contrast, angle closure glaucoma is more common among Asian populations [11]. Oman having a mixed population both of Asian and African origin, both types of glaucoma could exist in the community. For ethical reasons we could not collect data on race of Omani persons, so we could not assess the relationship between race and type of glaucoma; we found, however, both types in similar proportions (around 40%). As expected, because trachomatous corneal opacity is common in the elderly population in Oman [2] in some cases, gonioscopy was not possible. It is a matter of concern for the health planners that 5.0% of our sample had absolute glaucoma and 3.9% had lens-induced glaucoma, since lens-induced secondary glaucoma suggests that the cataract service is not available to all those who need it in good time. A few of those with glaucoma did not receive standard eye care in the early stages, and hence they advanced to the end stage.

In our sample, glaucoma was positively associated with older age and family history of glaucoma. This confirmed the observa-

tions of Zoorob, Khouri and Malpani [14] and Landers, Goldberg and Graham [15]. We did not find a significant association of history of diabetes with glaucoma, in contrast to the study by Zghal et al. [16]. Although prevalence of diabetes is 10% in the Omani population > 20 years of age [17], and our study indicates that around 1/20 persons ≥ 30 is likely to suffer from glaucoma, we did not observe a significant association between the 2 conditions. This needs further investigation through a longitudinal study with a larger sample. Treated hypertension causing diastolic blood pressure of < 90 mmHg has been associated with increased cupping and decreased rim area of the optic disk. Affected eyes could be labelled as suffering from glaucoma [18]. In our study, history of hypertension was found to have negative association with glaucoma. Compliance to medical treatment for glaucoma is very poor in Oman [19]. In a similar way, people with hypertension may not be taking medication regularly and would be likely to have higher blood pressure. With high pressure in the capillaries, perfusion to surrounding tissues might be better and thus the retina and the neuro-retinal rim will be protected from glaucomatous damage.

More than 60% of glaucoma cases had vision > 6/60. This shows how challenging it will be to advocate treatment for glaucoma in Oman. Chatkin et al. found that there was a significant difference in compliance in relation to asthma severity [20]. Similarly, if vision in either the eye with glaucoma or in the fellow eye is good and the patient can continue his/her daily work, the drive for judicious follow-up of advice and treatment will be poor.

On examining optic cup and disc, using 0.5 C:D ratio as the cut-off value to define glaucoma could be argued to be too permissive, which might have resulted in overestimates of glaucoma prevalence in

our study. In the absence of stereoscopic viewing, glaucomatous changes might have been missed in a few eyes. This could have resulted in under-estimation of prevalence of glaucoma.

Inability to test field of vision in the house-to-house screening was a severe limitation in our study. Cases that had pressure < 22 mmHg and C:D ratio < 0.5, but having glaucomatous field changes might have been missed. Frequency doubling perimetry (FDP) has been recommended as a tool for glaucoma screening [21]. A study conducted in Oman to validate the role of field of vision by FDP in glaucoma screening indicated that it may detect an additional 7.5% of glaucoma cases [22]. If we had applied FDP screening during Phase I of our study, it is likely we would have picked up cases that had early glaucoma field changes without having cup changes or rise in ocular pressure. Therefore, applying this to our estimate of 4.75%, the true prevalence in Oman could be up to 5.1%.

Our findings suggested that attempts to estimate the magnitude and determinants of glaucoma, blindness, low vision and other diseases affecting an older population should be carried out simultaneously, and even though the definition of glaucoma may differ from the very strict definition that would require sophisticated and costly instruments, the data generated through a community-based survey could still be a useful public health tool.

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Prevention of avoidable blindness and visual impairment

The WHO Prevention of Blindness team works with Member States through WHO regional offices to develop strategies for prevention and control of blindness and visual impairment. Team members, together with our many partners in the field, including nongovernmental organizations and WHO collaborating centres, work with country-based teams to support the implementation of the strategies developed. In addition, to facilitate ongoing strategic planning, the Prevention of Blindness team co-ordinates the collection and dissemination at national, regional, and global levels of data that reflect the burden of visual impairment and the implementation of programme strategies. The objective of the team is to assist WHO Member States to effectively prevent blindness and restore sight, when possible. The global target is to ultimately reduce blindness prevalence to less than 0.5% in all countries, or less than 1% in any country.