

guide, then visits all households in the segment door-to-door, until 50 people aged over 50 are identified. If the segment does not include 50 people aged over 50, another segment is chosen at random and sampling continues. If people are not available when the team arrives at the house, the team should revisit them so that they can be screened. This compact segment sampling is less subject to bias and has therefore replaced the 'random walk' method that was used in RACSS.

Ophthalmic examination

All eligible people undergo a standardised ophthalmic examination in their households. The team measures a distance of 3 and 6 meters with a rope, marking these on the floor. Visual acuity (VA) is measured with a Snellen tumbling E chart, using optotype size 18 (60) on one side and size 60 (200) on the other side at a 6 or 3 metre distance. This allows each eye to be classified as:

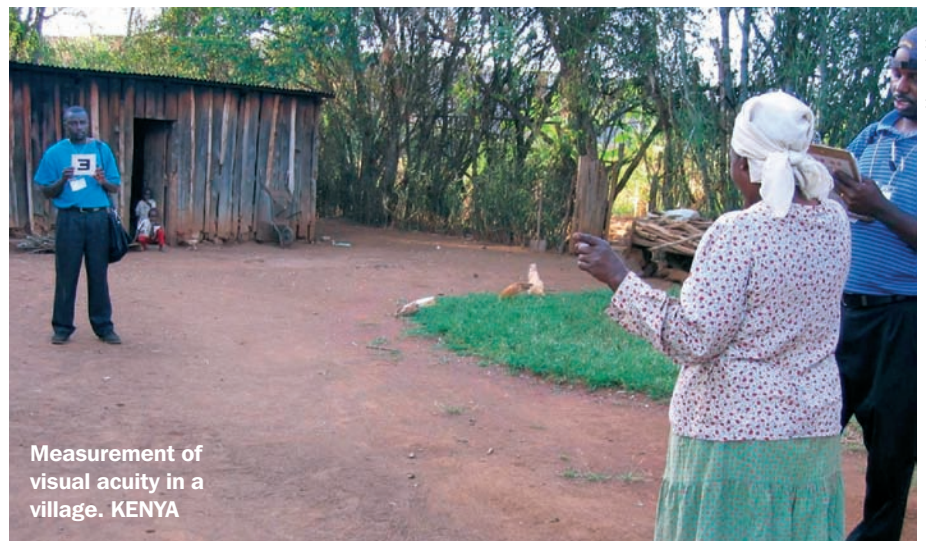
- can see 6/18
- cannot see 6/18 but can see 6/60
- cannot see 6/60 but can see 3/60
- cannot see 3/60 but can see 1/60
- light perception
- no light perception.

If the person cannot see 6/18 in either eye with available correction, pinhole vision will also be measured. It is difficult to measure vision accurately and one must ensure that the subjects clearly understand what is required of them in the visual acuity test.

The lens status of all participants is assessed by both torch and distant direct ophthalmoscopy, by an ophthalmologist or ophthalmic clinical officer in a shaded or dark environment. All eyes that cannot see 6/18 with available correction are examined with a direct ophthalmoscope (and with a portable slit lamp if available) to assess the cause of the visual impairment. Only the primary cause of blindness or visual impairment is recorded. If there are two or more primary disorders, equally contributing to the visual loss, then the WHO convention is to record the cause that is easiest to treat or to prevent. All information is recorded on a standardised form. People who have a vision-impairing cataract are asked why they have not undergone cataract surgery, and up to two responses are marked per person in pre-coded categories. Those who have undergone cataract surgery are asked about the details of their operation (e.g. place, age, type of operation, satisfaction). People with a treatable eye condition should be referred for appropriate treatment.

Teams and training

Each team should consist of one ophthalmologist or ophthalmic clinical officer, who can diagnose the eye diseases, and of one assistant who can measure visual acuity. The teams will be accompanied every day by a local village guide. It is useful to have between two and five teams to minimise the duration of fieldwork. All teams should be trained for at least four days, including a



Measurement of visual acuity in a village. KENYA

Hannah Kuper

field practice where all teams cover one selected cluster. Training should be undertaken by someone experienced in using the RAAB methodology. The survey will usually take between 4 and 12 weeks, depending upon the sample size and the number of teams. The cost of the survey will be largely determined by salaries, allowances, and transport, but is usually between UK £10,000 (US \$19,000) and UK £15,000 (US \$28,500).

Data entry and data analysis

A programme has been developed in Visual FoxPro version 7.0[®] for data entry and automatic standardised data analysis for RAAB. In-built consistency checks and validation through double entry are used to identify and correct any errors in recording and data entry. Automated data analyses are performed on the cleaned data set. These produce estimates of:

- prevalence of blindness, severe visual impairment (SVI), and visual impairment (VI)
- age- and sex-adjusted prevalence of blindness, SVI, and VI
- prevalence of avoidable blindness, SVI, and VI
- causes of blindness, SVI, and VI
- cataract surgical coverage
- outcome after cataract surgery
- causes of poor outcome
- satisfaction with cataract surgery
- barriers to uptake of cataract surgery.

All tables report results for men and women separately, as well as together.

Feedback and reporting

There is no point in conducting a survey unless the data are going to be used for programme planning or monitoring. A report of the RAAB, including the results, should be written and circulated to stakeholders in the programme. The results from the RAAB should be used to develop a VISION 2020 action plan, to plan the cataract surgical services required, for instance, or to identify problems, such as poor outcomes after surgery or significant barriers to surgery, so

that strategies can be developed to overcome these difficulties.

Conclusions

RAAB provides the necessary data to plan eye care programmes and also to monitor programmes, if repeated every three to five years. RAAB has been successfully undertaken in Kenya,¹ Bangladesh,² the Philippines, Botswana, Rwanda, Mexico, and China.

What RAAB does not do

Since examinations in RAAB are conducted door-to-door, the diagnostic facilities are limited, and it may not always be possible to accurately diagnose causes of posterior segment disease. RAAB only includes people aged over 50, therefore the prevalence of blindness in people aged under 50 cannot be estimated. RAAB measures the prevalence and causes of visual impairment, but it does not assess active trachoma, trichiasis, or infection with onchocerciasis when these are not vision-impairing.

If you are interested in conducting a RAAB in your setting, or if you have further queries about conducting a RAAB, please contact Hans Limburg or Hannah Kuper (Email: hannah.kuper@Lshtm.ac.uk). We strongly encourage you to hire experienced professionals to assist in the preparation and training for the RAAB. This will improve the reliability and quality of your survey data.

References

- 1 Mathenge W, Kuper H, Limburg H, Polack S *et al*. Rapid Assessment of Avoidable Blindness in Nakuru District, Kenya. *Ophthalmol*. In press.
- 2 Wadud Z, Kuper H, Polack S, Lindfield R, Akm MR, Choudhury KA *et al*. Rapid Assessment of Avoidable Blindness and Needs Assessment of Cataract Surgical Services in Satkhira District, Bangladesh. *Br J Ophthalmol* 2006 Oct;90(10): 1225-9.
- 3 Limburg H, Kumar R, Indrayan A, Sundaram KR. Rapid assessment of prevalence of cataract blindness at district level. *Int J Epidemiol* 1997;26(5): 1049-54.
- 4 Dineen B, Foster A, Faal H. A rapid methodology to assess the prevalence and causes of blindness and visual impairment. *Ophthalmic Epidemiol* 2006;13: 1-4.
- 5 Resnikoff S, Pascolini D, Ety'ale D, Kocur I, Pararajasegaram R, Pokharel GP *et al*. Global data on visual impairment in the year 2002. *Bull World Health Organ* 2004;82: 844-51.
- 6 Turner AG, Magnani RJ, Shuaib M. A not quite as quick but much cleaner alternative to the Expanded Programme on Immunization (EPI) Cluster Survey design. *Int J Epidemiol* 1996;25(1): 198-203.