

SCIENTIFIC CORRESPONDENCE

Blindness: how to assess numbers and causes?

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Background: Traditionally, blindness surveys have modelled themselves on the “gold standard” of a census and examination of a whole population. Blindness, however, is a relatively rare condition even in badly affected communities; hence, large sample sizes are required to gain adequate estimates of prevalence, particularly by cause.

Methods: Three assessments of blindness prevalence and aetiology in the same communities are reported. One involved asking individuals questions concerning their visual status during a census (perceived visual status, PVS), one involved examination of all ostensibly visually disabled people presenting to a central point within each community (examination of the visually disabled, EVD), and the final assessment involved a gold standard examination of the whole population (whole community examination, WCE).

Results: In a population of 8139 the blindness prevalence was 2.7% PVS, 3.6% EVD, and 3.1% WCE. Attributed causes of blindness were not representative in the PVS except for cataract. The EVD yielded cause specific estimates not far from those found at WCE except for a relative under-representation of glaucoma and optic atrophy.

Conclusion: Since cataract is, by a significant margin, the most common cause of blindness in the world such a simple method as asking individuals if they are blind and what they believe to be the cause may yield adequate estimates of the problem for planning eye care strategies for this condition. Alternatively, an ophthalmologist visiting villages and examining allcomers for visual disability may provide reasonably accurate cause specific prevalence estimates without the expense of a major blindness survey.

The WHO initiative “Vision 2020” throws down a major challenge for all ophthalmologists—“the elimination of all avoidable blindness.”¹ Clearly an early task to be undertaken in any attempt to address this challenge is the estimation of the numbers blind and the causes of blindness in any given population. Interventions can then be planned to target major preventable causes with adequate resources.

Traditionally, blindness surveys have modelled themselves on the “gold standard” of a census of the population with examination of the whole population or a random sample thereof.^{2–4} Blindness, however, is a relatively rare condition even in badly affected communities; hence, large sample sizes are required to gain adequate estimates of prevalence, particularly by cause.

In a large population based trial of ivermectin for onchocerciasis⁵ we had the opportunity to assess three different methods of determining the prevalence and causes of blindness. We present here the results of a comparison of these three methods, and discuss their implications for planners developing strategies for Vision 2020 programmes.

METHODS

In 1988 a census was performed of 34 communities in onchocercal areas in Kaduna State, northern Nigeria. In these

communities some 70% of individuals aged 20 years and above had onchocercal infection detectable in skin snips. At the time of the census two assessments were made of blindness in this population.

Perceived visual status (PVS)

Blindness

The individual performing the census asked people about their vision. There is no standard word for blindness in Hausa, the local lingua franca. Discussion with native speakers suggested using the question “Ka na taba gani sose?” which translates roughly as “Do you see properly?” Those who felt they could not see properly were then asked if the problem was unilateral or bilateral. In our analyses attention is restricted to individuals aged 5 years and above, with individuals reporting a bilateral problem being considered as “blind.”

Causation

Individuals were also asked an open question concerning the cause of the problem before being prompted for some specific causes: cataract (“yana”), injury (“cuta”), association with measles (“bakwandaro”), and association with meningitis (“sankarau”).

Denominator

Those living in the villages aged 5 years or more identified by the census.

Examination of the visually disabled (EVD)

Independently of the census, villagers were informed by word of mouth that an eye doctor was available to examine individuals with eye problems. A central location in each village was used for most examinations. The ophthalmologist visited the homes of any too infirm to attend the central location.

Blindness

Visual acuity was assessed using single E optotypes. Individuals were classified as bilaterally blind according to WHO acuity criteria only.³ The numerator included all bilaterally blind individuals aged 5 years and above presenting for examination; no attempt was made to check that the individual really lived in the village concerned.

Causation

The ophthalmologist had a torch loupe magnifier and a direct ophthalmoscope. S/he recorded the most likely principal cause of blindness using these instruments.

Denominator

Those living in the villages aged 5 years or more identified by the census.

Whole community examination at a central point (WCE)

Nine months after the census the communities were revisited by a team of six trained ophthalmic nurses and two ophthalmologists and a third assessment of blindness made.

Table 1 Blindness prevalence estimates by three different methods in 34 communities mesoendemic for onchocerciasis, Kaduna State, northern Nigeria

	Perceived visual status	Examination of visually disabled	Whole community examination
Number blind	221	296	213
Denominator	8139	8139	6831
Overall prevalence estimate (95% CI)	2.7 (2.4 to 3.1)	3.6 (3.2 to 4.1)	3.1 (2.7 to 3.6)

Table 2 Attributed cause of blindness among the bilaterally blind as determined by three different methods of assessment (WCE, EVD, and PVS) in communities mesoendemic for onchocerciasis, Kaduna State, Nigeria

Attributed cause	Number (%) of blind individuals attributed to cause		
	Reported cause at perceived visual status (n=221)	Diagnosis (right eye) at examination of visually disabled (n=296)	Diagnosis (right eye) at whole community examination (n=213)
Cataract	13 (6%)	29 (10%)	14 (6%)
Trachoma	2* (1%)	26 (9%)	20 (9%)
Optic atrophy in absence of other pathology	0 (0%)	12 (4%)	24 (11%)
Onchocerciasis	11† (5%)	157 (53%)	92 (43%)
Glaucoma	0 (0%)	14 (5%)	23 (11%)
Other	195 (88%)	58 (20%)	40 (19%)

*Trachoma was recognised as "lash irritation" or words to that effect.

†The word "filaria" was probably the colloquial term used to describe this entity by 5 individuals. Six of the 11 blind from "onchocerciasis" said they went blind after taking "banocide," "itching tablet," or "filaria medicine."

Blindness

These results have been presented previously in this journal.⁶ All compounds were visited and all individuals aged 5 years and above at the census were asked to present to a central point in the community. After informed consent individuals underwent a full visual function assessment and ophthalmic examination. Single E optotypes were used for visual acuity assessments. Visual field was also assessed using counting fingers to confrontation, 6 mm pin to confrontation, a "red dot card test,"⁷ and Friedmann Mark I field analysis. Individuals were classified as bilaterally blind according to WHO acuity and field criteria.^{3,6}

Causation

Those identified as blind were examined for the principal cause by the ophthalmologists using a full array of diagnostic equipment including slit lamp and indirect ophthalmoscopy.

Denominator

Those attending for examination.

RESULTS

The prevalence estimates for blindness obtained by the three different methods are shown in Table 1.

The highest estimate of blindness prevalence was obtained with the examination of visually disabled. In all, 510 individuals presented for examination, of whom 296 were bilaterally blind. The lowest estimate was obtained with the perceived disability method.

Table 2 presents the distribution of causes of blindness ascertained by each method.

Many of the "other" causes reported as perceived causes of blindness during the perceived visual status survey were symptoms (for example, painful eyes) or causes which would not be found in most ophthalmological textbooks (for example, witchcraft, act of God). Nevertheless, for cataract, the one common condition for which a local term existed, the estimated proportion of blindness due to that condition

was very close to that obtained from the whole community examination. The examination of visually disabled clearly identified onchocerciasis as the leading cause of blindness and had similar proportions of cataract and trachoma to the whole community examination. Glaucoma and optic atrophy had lower proportional representation in the examination of visually disabled than the whole community examination.

DISCUSSION

It is interesting that the estimates of blindness by all three methods are not wildly dissimilar. If a majority of the 16% who did not attend for the WE are assumed to be healthy and working then the prevalence estimates from the PVS and WCE are even more nearly matched.

Intuitively, it is surprising that more individuals did not report themselves blind, especially since our question was by linguistic constraints so apparently non-specific. Could this be a particular feature of our study population? Such evidence as we can find suggests this is not the case. In the Salisbury Eye Examination project (SEE) in the United States, individuals were asked the question "How would you rate your general vision on a scale 0–10 where 0 is blind and 10 is good vision?"⁸ The prevalence of bilateral blindness estimated from the response to this question (0.27%) was slightly lower than that found in examined individuals (0.32%). Despite a different language, culture, environment, and a 10-fold difference in prevalence the proportionate difference is similar in each population ($2.7/3.1 = 0.87$ v $0.27/0.32 = 0.84$).

Another surprise is the nearness of the estimate taking all-comers for the examination of visually disabled at a central point. Furthermore, the method gave good estimates of causation.

The perceived cause of blindness yielded what may be initially interpreted as disappointing estimates of causes of blindness. The estimate for cataract, however, is reasonable. We believe two possible reasons may account for this. Firstly, the cause of blindness is frequently visible in the form of a

white pupil (leucocoria). Secondly, where there is a local word for an *easily recognisable* condition, especially cataract and measles associated corneal leucoma, there is the potential of using oral interviews to obtain reasonable estimates of the prevalence of the condition. It should be noted that trachoma does not have a local term and was not identified as a perceived cause of blindness despite the condition being easily recognised.

In the context of Vision 2020, the implications of these findings are quite far reaching. Since cataract is, by a significant margin, the most common cause of blindness in the world such a simple method as asking individuals if they are blind and what they believe to be the cause, may yield adequate estimates of the problem for planning eye care strategies for this condition. Alternatively an ophthalmologist visiting villages and examining allcomers for visual disability may provide reasonably accurate cause specific prevalence estimates without the expense of a major blindness survey.

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REFERENCES

- 1 **Foster A**. Cataract and "Vision 2020: the right to sight" initiative. *Br J Ophthalmol* 2001;**85**:635-7.
- 2 **Thylefors B**. A simplified methodology for the assessment of blindness and its main causes. *World Health Statistical Quarterly* 1987;**40**:129-41.
- 3 **World Health Organization**. *Methods of assessment of avoidable blindness*. WHO offset publication No 54. Geneva: WHO, 1980.
- 4 **Faal H, Minassian D, Sowa S, et al**. National survey of blindness and low vision in the Gambia: results. *Br J Ophthalmol* 1989;**73**:82-7.
- 5 **Abiose A, Jones B, Cousens S, et al**. A randomized, controlled trial of ivermectin for onchocerciasis: evidence for a reduction in incidence of optic nerve disease. *Lancet* 1993;**341**:130-4.
- 6 **Abiose A, Murdoch I, Babalola O, et al**. Distribution and aetiology of blindness and visual impairment in mesoendemic onchocercal communities, Kaduna State, Nigeria. *Br J Ophthalmol* 1994;**78**:8-13 [Correction *Br J Ophthalmol* 1995;**79**:197]
- 7 **Murdoch IE, Jones BR, Babalola OE, et al**. Red dot card test of the paracentral field as a screening test for optic nerve disease in onchocerciasis. *Bull World Health Organ* 1996;**74**:573-6.
- 8 **Rubin GS, West SK, Munoz B et al** and the SEE project team. A comprehensive assessment of visual impairment in a population of older Americans. The SEE study. *Invest Ophthalmol Vis Sci* 1997;**38**:557-68.

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