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**SHORT COMMUNICATIONS & CASE REPORTS**

# Causes of blindness at Nkhoma Eye Hospital, Malawi

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PURPOSE. *The majority of blindness in Sub-Saharan Africa is treatable. This hospital-based study was undertaken in order to investigate the etiology of blindness at Nkhoma Eye Hospital, Malawi.*
METHODS. *One ophthalmologist examined 2082 consecutive new patients who presented to the outpatient department at Nkhoma Eye Hospital, Malawi in 2006. Data recorded included age, sex, visual acuity and diagnosis. Patients were classified as blind if their best corrected visual acuity was <3/60 in one eye (unilateral) or two eyes (bilateral).*
RESULTS. *The most common diagnosis in new outpatients was cataract (52.8%), followed by glaucoma (8.1%), corneal pathology (7.2%), uveitis (4.5%) and maculopathy (3.2%). There were 742 (35.6%) patients with unilateral blindness and 331 (15.9%) patients with bilateral blindness. Unilateral blindness was present in 37.4% of males and 26.5% of females. The most common causes of unilateral blindness were lens pathology (57.8%), followed by glaucoma (12.1%), corneal pathology (10.0%) and uveitis (6.1%). Bilateral blindness was present in 12.5% of males and 16.8% of females respectively. The most common causes of bilateral blindness were lens pathology (54.4%), followed by glaucoma (19.9%), retinopathy (3.6%), maculopathy (3.6%), uveitis (3.6%) and corneal pathology (3.3%).*
CONCLUSIONS. *Cataract is the most common cause of blindness in Nkhoma. Resultantly, cataract management is preferentially targeted in the Nkhoma VISION2020 Programme. Training of auxiliary eye personnel in cataract diagnosis and surgery may assist in this approach. (Eur J Ophthalmol 2008; 18: 1002-6)*

KEY WORDS. *Cataract, Malawi, Sub-Saharan Africa, Blindness*

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## INTRODUCTION

The majority of blindness in sub-Saharan Africa is treatable. In 2001, it was estimated that approximately 1% of Africans were blind, with cataract accounting for approximately half of all cases (1). "VISION 2020: The Right to Sight" was launched in 1999 as a partnership between the World Health Organization (WHO) and the International Agency for the Prevention of Blindness (IAPB), and is the global initiative for elimination of avoidable blindness (WHO/PBL/97.61 Rev 1). Important principles inherent to a district VISION 2020 programme include cost-effective disease prevention and treatment, human resources, and infrastructure development. These principles should be integrated into existing national healthcare systems and be sustainable, equitable, and of a high standard.

In Malawi, there are three tertiary eye centers, which are located at Nkhoma, Lilongwe, and Blantyre. Nkhoma Eye Hospital is situated 40 km from the capital Lilongwe and has 35 full-time staff including a full-time ophthalmologist. A second full-time ophthalmologist was posted to Nkhoma in December 2007. The catchment area of

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Nkhoma encompasses the central-eastern and the central-western regions of Malawi. The aim of this study was to determine the etiology of blindness in outpatients seen by an ophthalmologist at Nkhoma Eye Hospital, Malawi.

## METHODS

We reviewed consecutive outpatients who were examined by an ophthalmologist at Nkhoma Eye Hospital, Malawi, between January 1 and December 31, 2006. Gender, visit status (new or follow-up), and age (0–5, 6–15, and >15 years) were recorded.

Ocular diagnoses were categorized according to their anatomical location and pathology. If there was more than one cause of bilateral blindness, the two major causes were recorded (combination pathology).

All patients had their visual acuity (VA) recorded with a Snellen (E) chart at 6 meters or counting fingers between 5 and 1 meter, then hand movement and perception of light. Patients were classified as blind if their best-corrected VA was <3/60 in one eye (unilateral) or two eyes (bilateral). The ophthalmologist used a direct and/or indirect ophthalmoscope, as well as a slit lamp with condensing lens. Goldman or Perkins applanation tonometry was performed for measurement of intraocular pressure. Additional diagnostic testing including blood chemistry, serology, and histopathology were performed when necessary, and if available at Nkhoma.

## RESULTS

A total of 2288 patients were examined by an ophthalmologist in the outpatient clinic. Of the total, 2082 (91.0%) were new patients, 1235 (54.0%) were male, and 157 (6.8%) were younger than 16 years. The diagnosis of the new patients was recorded (Tab. I).

There were 742 (35.6%) new patients with unilateral blindness (Fig. 1), of whom 463 (62.4%) were male. Unilateral blindness was present in 37.4% of males and 26.5% of females. There were 14 (1.9%) persons aged between 0 and 5, 10 (1.4%) aged between 6 and 15, and 718 (96.7%) aged over 15.

There were 331 (15.9%) new patients with bilateral blindness (Fig. 2), of whom 154 (46.5%) were male. Bilateral blindness was present in 12.5% of males and 16.8% of females. All persons with bilateral blindness were aged over 15, excluding 7 persons (2.1%) aged between 0 and 5.

The specific etiology of blindness was also recorded (Tab. II). In addition to the diagnoses in Table II, there were 6 cases of blinding trachoma (unilateral n=2; bilateral n=4), and 4 cases of trauma-induced blindness (unilateral n=3; bilateral n=1). Conjunctival carcinoma, secondary to HIV seropositivity, accounted for a further 5 cases of blindness (unilateral n=5).

## DISCUSSION

The majority of blindness in this Malawian eye hospital is treatable. Cataract blindness is overwhelmingly the most common cause of blindness, accounting for approximately half of all cases, followed by glaucoma. Only a small percentage of blindness was attributed to posterior segment diseases. These findings are consistent with a review of blindness in Africa (1). In 1999, the age-adjusted prevalence of bilateral blindness (VA<3/60) in Malawi was 4.0% and had decreased over a 16-year period (2). An earlier study performed in Malawi found that cataract accounted for 40% of causes of bilateral blindness (3). There was also a very high prevalence of corneal disease (30%) in this study, secondary to widespread malnutrition, trachoma, and measles infection.

The ophthalmologist does not examine all of the outpatients at Nkhoma. A further 1510 patients were seen in 2006 by auxiliary ophthalmic personnel, of whom 164 (10.9%) were bilaterally blind, with 47% due to cataract. In addition, more than 700 persons were examined in the optical department by a refractionist. In contrast to auxiliary ophthalmic personnel, the ophthalmologist is more likely to see patients requiring surgery or complex management, patients with severe disease, and cases with a high degree of diagnostic uncertainty.

The cataract surgical coverage (CSC) in Nkhoma has increased over the past few years, due to an exponential increase in the number of surgeries performed, and increased access to surgical services for the blind. Cataract surgery performed at Nkhoma has a very high success rate and there is a very high turnover of patients, with more than 4500 surgeries being performed in 2005, and more than 18,000 cataract operations performed since 2000. In a prevalence study, cataract accounted for 62% of bilateral and 47.5% of unilateral blindness, with a corresponding CSC for blinding cataract of 14.8% within a 10 mile radius of Nkhoma (4). A similar study was carried out in 2006, in the same area, and a much higher CSC of

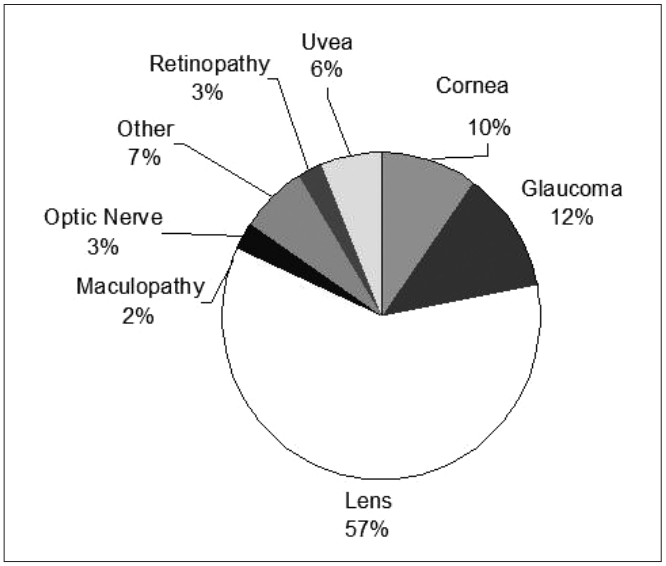


**Fig. 1 -** *Causes of unilateral blindness at Nkhoma Eye Hospital (n=742).*

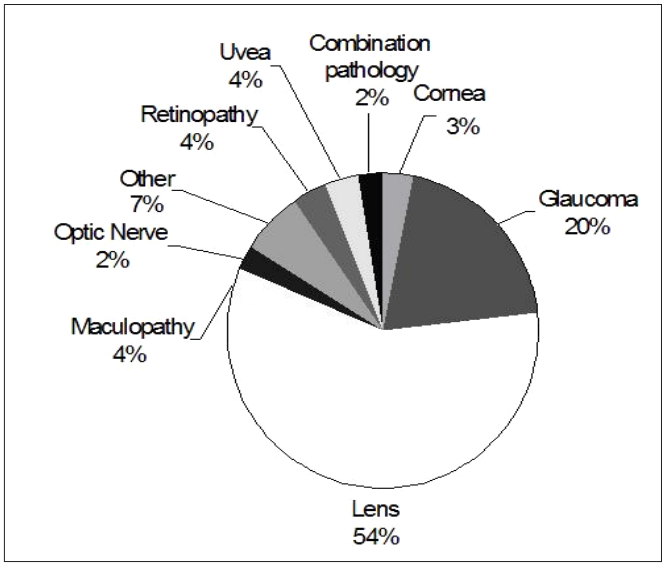


**Fig. 2 -** *Causes of bilateral blindness at Nkhoma Eye Hospital (n=331).*

83.3% was found (unpublished).

Barriers to receiving cataract surgery in sub-Saharan Africa include economic constraints, poor access and knowledge of available services, and sociocultural reasons (1). In order to ensure that persons with cataract blindness are more likely to have surgery in this low-income region, patients are provided with free surgery at Nkhoma. Furthermore, over 90% of cataract operations are due to active cataract case finding. Nkhoma Eye Programme employs two community cataract screeners who run daily screening clinics, and mobile outreach clinics are performed 2 days per week. These factors have contributed to the exponential increase in cataract surgery performed at Nkhoma. In the future, training of auxiliary eye workers in cataract surgery may increase the cataract surgical output at Nkhoma.

Childhood blindness is rarely seen in the outpatient department and 11 cases were seen in 2006. Gilbert et al found that approximately half of the cases of avoidable causes of visual impairment and blindness in children in Malawi were due to measles/vitamin A deficiency (5). Through cooperation with the Ministry of Health, 247,000 vitamin A capsules were distributed to Under 5 Clinics in the surrounding region of Nkhoma in 2006. Very few children present with refractive errors, presumably due to a very low prevalence in the community (6). All children with refractive errors are provided with free spectacles.

Glaucoma is the second most common cause of bilateral blindness in Nkhoma and is predominantly of the primary open angle glaucoma (POAG) subtype. On average, 50 trabeculectomies (with 5-flurouracil) are performed annually, which remains the first line treatment for POAG. Use

**TABLE I -** OCULAR PATHOLOGY IN PATIENTS PRESENTING TO NKHOMA EYE HOSPITAL OUTPATIENT DEPARTMENT AND EXAMINED BY AN OPHTHALMOLOGIST (N=2082)

| Pathology | N | % |
|---|---|---|
| Cataract | 1099 | 52.8 |
| Glaucoma | 169 | 8.1 |
| Corneal | 149 | 7.2 |
| Uveitis | 93 | 4.5 |
| Maculopathy | 66 | 3.2 |
| Refractive (including presbyopia) | 40 | 1.9 |
| Allergic conjunctivitis | 39 | 1.9 |
| Conjunctival carcinoma | 39 | 1.9 |
| Retinopathy | 39 | 1.9 |
| Trauma/foreign body | 40 | 1.9 |
| Optic atrophy | 40 | 1.9 |
| Lid pathology | 35 | 1.7 |
| Pterygium/ pinguecula | 25 | 1.2 |
| Infective conjunctivitis | 19 | 0.9 |
| Orbit/proptosis | 19 | 0.9 |
| Other ocular complications of HIV | 15 | 0.7 |
| Trachoma | 10 | 0.5 |
| Other/unknown | 146 | 6.9 |
| **Total** | **2082** | **100.0** |

**TABLE II -** ETIOLOGY OF UNILATERAL AND BILATERAL BLINDNESS IN NKHOMA

| Location | Diagnosis | Unilateral blindness | | Bilateral blindness | |
|---|---|---|---|---|---|
| | | N | % Of respective location | N | % Of respective location |
| Lens | Senile cataract | 383 | 89.4 | 165 | 91.6 |
| | Traumatic cataract | 12 | 2.8 | 4 | 2.2 |
| | Dislocated Lens | 7 | 1.6 | 2 | 1.1 |
| | Complicated cataract | 7 | 1.6 | 3 | 1.7 |
| | Aphakia | 7 | 1.6 | 2 | 1.1 |
| | Subluxed lens | 4 | 0.9 | 2 | 1.1 |
| | Posterior capsule opacification | 4 | 0.9 | 1 | 0.6 |
| | Congenital cataract | 3 | 0.7 | 1 | 0.6 |
| | Juvenile cataract | 2 | 0.5 | 0 | 0.0 |
| | **Subtotal** | **429** | **100.0** | **180** | **100.0** |
| Glaucoma | Primary open angle glaucoma | 76 | 84.5 | 50 | 75.8 |
| | Phacolytic | 11 | 12.2 | 1 | 1.5 |
| | Normotensive | 2 | 2.2 | 14 | 21.2 |
| | Buphthalmos/congenital | 1 | 1.1 | 1 | 1.5 |
| | **Subtotal** | **90** | **100.0** | **66** | **100.0** |
| Uvea | Anterior uveitis | 34 | 75.6 | 7 | 58.3 |
| | Panuveitis | 7 | 14.6 | 3 | 25.0 |
| | Posterior uveitis | 4 | 9.8 | 2 | 16.7 |
| | **Subtotal** | **45** | **100.0** | **12** | **100.0** |
| Corneal | Scar | 27 | 36.6 | 5 | 45.5 |
| | Ulcer | 18 | 24.4 | 2 | 18.2 |
| | Keratitis | 11 | 14.6 | 1 | 9.1 |
| | Phthisic | 7 | 9.8 | 1 | 9.1 |
| | Abscess | 5 | 7.3 | 1 | 9.1 |
| | Staphyloma | 5 | 6.1 | 1 | 9.1 |
| | Keratoconus | 1 | 1.2 | 0 | 0.0 |
| | **Subtotal** | **74** | **100.0** | **11** | **100.0** |
| Optic nerve | Atrophy | 17 | 89.4 | 6 | 75.0 |
| | Secondary to ethambutol | 1 | 5.3 | 0 | 0.0 |
| | Neuritis | 1 | 5.3 | 2 | 25.0 |
| | **Subtotal** | **19** | **100.0** | **8** | **100.0** |
| Macula | Scar | 7 | 52.6 | 9 | 75.0 |
| | Hole | 4 | 31.6 | 1 | 8.3 |
| | Age-related macular degeneration | 2 | 10.5 | 1 | 8.3 |
| | Unknown | 1 | 5.3 | 1 | 8.3 |
| | **Subtotal** | **14** | **100.0** | **12** | **100.0** |
| Retina | Retinal detachment | 6 | 31.5 | 3 | 25.0 |
| | Central retinal artery occlusion | 5 | 26.3 | 0 | 0.0 |
| | Retinitis pigmentosa | 3 | 15.8 | 5 | 41.7 |
| | Retinoblastoma | 2 | 10.5 | 0 | 0.0 |
| | Cytomegalovirus (CMV) retinitis | 1 | 5.3 | 3 | 25.0 |
| | Toxoplasma choroidoretinitis | 1 | 5.3 | 1 | 8.3 |
| | Central retinal vein occlusion | 1 | 5.3 | 0 | 0.0 |
| | **Subtotal** | **19** | **100.0** | **12** | **100.0** |
| Other/ unknown | | 52 | | 22 | |
| Combination | N/A | N/A | N/A | 8 | 100.0 |
| **Total** | | **742** | | **331** | |

of ocular hypotensive therapy is restricted due to accessibility and economic barriers as well as difficulties with medication compliance.

Trachoma still occurs in pockets in the catchment area of Nkhoma. The WHO has advocated the SAFE (surgery for trichiasis, Antibiotics, Facial cleanliness, and Environmental improvements) intervention for trachoma eradication. However, only limited supplies of tetracycline ointment are available for trachoma eradication in Malawi. Despite an absence of mass antibiotic administration, environmental and sanitary improvements have led to a reduction in trachoma prevalence in Malawi (7). The procedure of choice at Nkhoma is the tarsal plate rotation procedure and over 1500 operations have been carried out since 2000. Auxiliary ophthalmic personnel trained by the ophthalmologist perform the procedure, and 6 have been trained in this procedure at Nkhoma.

Onchocerciasis is not found in the central region of Malawi and no cases were seen at Nkhoma in 2006. However, onchocerciasis remains prevalent in some areas of Malawi. In the Thyolo highlands focus of Southern Malawi, it was found that more than 300,000 people were living in areas in which the prevalence of infection with *Onchocerca volvulus* was greater than 10% (8). Notwithstanding a high prevalence of infection in Thyolo, the number of persons bilaterally blinded from onchocerciasis was probably less than 0.1% of this population (8).

In Nkhoma, the majority of the causes of blindness are treatable. Cataract is the most common cause of blindness, accounting for approximately half of all cases, followed by glaucoma. Management of eye diseases that are preventable or easily treatable should be preferentially targeted in VISION2020 programs in Malawi and sub-Saharan Africa.

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