

# Causes of Visual Loss in Students Attending Schools for the Blind in South Eastern Nigeria

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## Abstract

**Objective:** To determine the causes of visual loss among students in special education centers for the blind in Abia and Ebonyi States, Nigeria. **Materials and Methods:** The study was a descriptive, cross-sectional study of students in two schools selected by random sampling of the schools for the blind in South East Nigeria. The students were interviewed and had a general examination. Ocular examination included visual acuity assessment, anterior and posterior segment examination, intraocular pressure measurement, and refraction. Responses and examination findings were recorded on the World Health Organization's Programme for the Prevention of Blindness eye examination record for children with blindness and low vision. **Results:** Ninety-two students were studied. The most common etiological causes of visual loss were cataract and hereditary diseases (23.9% each) followed by glaucoma (18.5%). Other causes were abnormalities since birth of unknown etiology (9.7%); childhood factors such as measles (2.2%) and cortical blindness/idiopathic nystagmus/primary optic atrophy (7.6%); trauma (7.6%); cerebral hypoxia (2.2%); harmful traditional practices (2.2%) and intrauterine factors such as drugs and alcohol (1.1%). Avoidable causes of blindness were seen in 64.2%. **Conclusion:** Cataract and hereditary diseases are the main reason for enrolment into blind schools in the region. To reduce the burden of childhood blindness, there is a need for interventions targeting improved antenatal care, discouraging harmful traditional practices, training of community level health workers for eye care/case detection, low vision and pediatric ophthalmic care.

**Keywords:** Avoidable blindness, blindness/causes, childhood blindness, schools for the blind, visual loss

## INTRODUCTION

About three quarters of the 1.4 million blind children in the world are in Africa and Asia.<sup>[1]</sup> The Nigeria National Blindness and Visual Impairment Survey found the prevalence of blindness in children aged 10–15 years in Nigeria to be 0.6%.<sup>[2]</sup>

The causes of visual impairment in children vary from one region to the other. Lesions of the optic nerve and higher visual pathways are the most common causes in developed countries, whereas corneal scarring from measles, vitamin A deficiency, use of harmful traditional eye remedies, ophthalmia neonatorum, and rubella cataract are the common causes in developing (low-income) countries.<sup>[1]</sup>

Blind children and young adults are faced with a lifetime of emotional, social and economic difficulties due to their disability.<sup>[3]</sup> Blind children also have a higher death rate compared to their sighted counterparts.<sup>[4]</sup>

Special education centers for the blind (schools for the blind) provide ready access to a significant proportion of the visually impaired children in the society for the assessment of the causes of childhood blindness. The World Health Organization (WHO) in a consultation hosted by the International Council for Education of the Visually Handicapped at Bangkok, Thailand recommended medical examination of children in schools for the blind as a means of identification of children with low vision.<sup>[5]</sup>

There has been no population-based study on childhood blindness in Abia and Ebonyi States, Nigeria. A study in Abia State of institutionalized blind children was published about 20 years ago.<sup>[6]</sup> It is better to use more current indices to

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plan ophthalmic services adequately as changes in etiology of childhood blindness are likely to exist.

This study was, therefore, conducted at two special schools for the blind in South East Nigeria (the Special Education Centre for the Blind, Afara, Umuahia, Abia State and School for the Blind, Iboko, Izzi, Ebonyi State) to determine the causes of visual impairment in children.

## MATERIALS AND METHODS

This was a cross-sectional study, conducted between December 2014 and February 2015, of all the students in the Special Education Centre for the Blind, Afara, Umuahia, Abia State and School for the Blind, Iboko, Izzi, Ebonyi State. These schools were selected out of the three Schools for the Blind in South Eastern Nigeria by simple random sampling.

The ethical clearance for this study was obtained from the Health Research Ethics Committee of the Federal Medical Centre, Umuahia. Approval for the study was also sought and obtained from the authorities of the respective schools, the Ministry of Education, Abia State and the Ministry of Education, Ebonyi State.

The World Health Organization's Programme for the Prevention of Blindness (WHO/PBL) eye examination record for children with blindness and low vision was used to record data obtained.<sup>[7]</sup> Distance visual acuity for each eye was assessed with a Snellen chart or illiterate E chart (as applicable) placed at 6 m in ordinary daylight on the veranda of the school's assembly hall.

The anterior segments were examined with a pen torch and simple magnifying loupe, and posterior segments were examined with a Keeler professional direct ophthalmoscope. The intraocular pressure was measured with a hand-held Perkin's tonometer after instilling 0.5% tetracaine hydrochloride anesthetic drops and 2% fluorescein dye. Pupils were dilated with 1% tropicamide drops where there was a poor view of the posterior segment and no dense corneal opacity. Refraction was performed for all the students except those with opaque media and those with no light perception vision.

Based on the presenting visual acuities, the students were classified into normal vision, moderate visual impairment, severe visual impairment and blind. If the students had more than one site of abnormality or cause of visual loss, in selecting the major site and main etiology, the guidelines given in the coding instructions manual for the WHO/PBL eye examination record for children with blindness and low vision<sup>[8]</sup> were followed.

Hereditary eye disease was deemed to be present in those with a definite family history or those with conditions due to a clinically well-recognized genetic or chromosomal abnormality.<sup>[8]</sup> Blindness was taken to be due to an intrauterine factor if it was present since birth and was attributable to events occurring during the intrauterine

period.<sup>[8]</sup> Blindness was defined as presenting visual acuity worse than 3/60 while low vision was defined as visual acuity <6/18 to  $\geq$ 3/60.<sup>[9,10]</sup>

Data collected were analyzed using the Epi Info 7 statistical package (Version 3.5.1, CDC, Atlanta, 2008). Variables were summarized using medians for quantitative variables and frequencies and proportions for qualitative variables.

## RESULTS

Ninety-two students (74.8%) were studied out of 123 students. Thirty-one students (25.2%) did not give consent (five of these 31 declined examination while the rest were absent from school during the period of the study in spite of repeat (two) visits).

The 92 students who were studied comprised 53 (57.6%) in the Special Education Centre for the Blind, Afara, Umuahia, Abia State and 39 (42.4%) in the School for the Blind, Iboko, Izzi, Ebonyi State. Table 1 shows the age and gender distribution of the 92 students.

There were 61 males (66.3%) and 31 females (33.7%) as shown in Table 1. Their ages ranged between 3 and 59 years (mean age 17.10 years, standard deviation 7.52, median age 16 years). There was no known history of consanguinity.

The main etiology for visual loss in the students is presented in Table 2. The most common were cataract and hereditary diseases in 22 (23.9%) students each, followed by glaucoma (17 students; 18.5%). Blindness was avoidable (preventable and treatable) in 59 students (64.2%). Preventable causes of blindness (in 20 students; 21.8%) included harmful traditional practices (in two students; 2.2%), intrauterine factors (such as ingestion of harmful alcohol-based traditional concoctions) in one student (1.1%), measles keratitis (in two students; 2.2%), rubella (in one student; 1.1%), trauma (in seven students;

**Table 1: Age and gender distribution of the 92 students**

Characteristic	Frequency (n = 92)	Percentage (%)
Age groups (years)		
1-5	3	3.3
6-10	7	7.6
11-15	33	35.9
16-20	28	30.4
21-25	13	14.1
26-30	4	4.3
31-35	3	3.3
36-60	1	1.1
Total	92	100
Gender		
Male	61	66.3
Female	31	33.7
Total	92	100
History of consanguinity		
None	91	98.9
Unknown	1	1.1
Total	92	100

**Table 2: Main etiology of visual loss**

Main etiology for visual loss	Frequency (n = 92)	Percentage (%)
Cataract	22	23.9
Hereditary disease	22	23.9
Glaucoma	17	18.5
Abnormality since birth, unknown etiology	9	9.7
Other childhood factor (primary optic atrophy, idiopathic nystagmus, cortical blindness)	7	7.6
Trauma	7	7.6
Cerebral hypoxia/injury	2	2.2
Harmful traditional practices	2	2.2
Measles	2	2.2
Intrauterine factor, drugs/alcohol	1	1.1
Congenital rubella syndrome	1	1.1
Total	92	100.0

7.6%), and other childhood factors such as cortical blindness or optic atrophy from poorly managed intracranial infections like meningitis (in seven students; 7.6%). Treatable causes of blindness (in 39 students; 42.4%) included cataract and glaucoma.

The hereditary diseases causing visual loss are shown in Table 3. They included microphthalmos (in eight students, 36.4%), retinitis pigmentosa (in four students, 18.2%), cataract with other ocular abnormalities (in four students, 18.2%), sclerocornea (in three students, 13.7%), corneal dystrophy (in one student, 4.5%), oculocutaneous albinism (in one student, 4.5%), and anophthalmos (in one student, 4.5%).

## DISCUSSION

The male-to-female ratio of 2:1 is similar to other studies<sup>[11-13]</sup> but higher than previous reports from South-East Nigeria.<sup>[6,14]</sup> In both schools there were more males than females. Presumably, the well-known gender bias in favor of males could account for more male blind children being sent to special education centers. Gilbert<sup>[15]</sup> in exploring, from the patient's perspectives, the context in which childhood blindness control programs are to be implemented the world over, noted that very poor families residing in remote rural areas may be more willing to invest money, time, and effort (scarce resources) in a son than a daughter. It could also possibly be that concerning childhood blindness, more males are affected than females possibly due to genetic predispositions (from X-linked disorders).<sup>[16]</sup>

The most common etiological causes of visual loss in this study were cataract and hereditary diseases [Table 2]. These causes are traceable to genetic factors. A study in one of the schools in South-East Nigeria (at Afara) 20 years ago also found cataract to be the most common cause in 24.2%, followed by corneal scarring and staphylococci in 17.7%.<sup>[6]</sup> Hereditary causes were not prominent at the time probably

**Table 3: Hereditary causes of visual loss**

Hereditary cause	Frequency (n = 22)	Percentage (%)
Microphthalmos	8	36.4
Retinitis pigmentosa	4	18.2
Cataract with other ocular abnormalities	4	18.2
Sclerocornea	3	13.7
Corneal dystrophy	1	4.5
Oculocutaneous albinism	1	4.5
Anophthalmos	1	4.5
Total	22	100.0

due to a higher contribution of measles keratitis and vitamin A deficiency to childhood blindness in the South East region then. The proportion of visual loss due to cataract may not have changed over the years possibly due to lack of periodic school screening of the students either before admission or during the course of their studies. In addition, actions may not have been taken by the relevant authorities to reduce the incidence of pediatric cataract. Cataract was also the most common cause in Ekiti (26.7%)<sup>[13]</sup> while in Java, Indonesia<sup>[11]</sup> and Lagos,<sup>[17]</sup> hereditary disease was the most common. However, childhood factors (e.g., measles, trauma, and harmful traditional practices) were the most common cause in East Africa and Oyo State.<sup>[18,19]</sup> Using the key informant method to identify blind children, Muhammad *et al.*<sup>[20]</sup> in North-West Nigeria also found that childhood factors were the most common etiological cause. Measles (a childhood factor) was the main etiology in only two students (2.2%) in this study. The report that childhood factors were the most common etiological cause in South-East Nigeria 14 years ago<sup>[14]</sup> could have been caused by the drop in immunization coverage at that time<sup>[21]</sup> Of the 22 students with hereditary causes of visual loss in this study, 10 (45.5%) had a family history of similar visual loss; the remaining 12 students (54.5%) with no family history of similar visual loss had onset of blindness from birth. The hereditary causes were microphthalmos, retinitis pigmentosa, cataract with pupillary and other ocular abnormalities, sclerocornea, corneal dystrophy, oculocutaneous albinism, and anophthalmos [Table 3].

Both eyes of one of the students with bilateral aphakia had been couched. This was significant as there was no report of couching in previous studies in schools for the blind in the South East region. Another student had blindness following the instillation of harmful traditional eye medications with resultant bilateral ankyloblepharon.

Based on the main etiologies of blindness as found in this study, blindness was avoidable in 64.2% (treatable in 42.4% and preventable in 21.8%). In two previous studies in South-East Nigeria, blindness was avoidable in 74.5%<sup>[14]</sup> and 77.0%.<sup>[22]</sup> The lower prevalence found in this study could be due to the declining contribution of measles to childhood blindness. One of the previous studies<sup>[14]</sup> found that measles

accounted for 64.8% of the childhood factors which was the most common etiology for visual loss then. In this study, measles accounted for only 18.2% of childhood factors (measles, harmful traditional practices, optic atrophy, idiopathic nystagmus, and cortical blindness). In North-West Nigeria, blindness was avoidable in all the subjects and cornea was the most common site of abnormality in 55%. This was mainly from measles, vitamin A deficiency, infective keratitis and trauma.<sup>[20]</sup> The reduction in measles prevalence, as has been pointed out earlier, could be due to a sustained improvement in immunization coverage as revealed by Nigerian estimates of 59% in 2013 compared to 30% in 2002.<sup>[21]</sup>

However, avoidable blindness prevalence of 64.2% is still quite high. This underscores the fact that efforts at implementation of VISION 2020 programs should be intensified. The higher prevalence of avoidable blindness in the North-West (100%)<sup>[21]</sup> could be explained by the immunization rejection in the Northern part of Nigeria,<sup>[23]</sup> so that despite rising national levels of immunization coverage, the North still records the lowest rates.<sup>[24]</sup>

This study had some limitations. Selection of one cause of blindness per head meant the second eye may be ignored resulting in incomplete statistics of the causes of blindness. Also, selecting a main etiology of blindness that is preventable or treatable over others may falsely exaggerate the contribution of avoidable causes to childhood blindness. But since these are conditions that can be managed, focusing on them would significantly reduce the burden of childhood blindness which is a priority of VISION 2020—the right to sight initiative of the WHO. In addition, the histories obtained from the students were incomplete as they, in most cases, had no knowledge of their parents' medical illnesses prior to and after their conception; mothers' use of drugs/toxic substances in pregnancy; and events during their birth and early years of life. The students were all boarding and their parents could not be interviewed individually. Lastly, drawing up family trees to determine the pattern of inheritance of suspected hereditary diseases was also not possible due to incomplete information.

## CONCLUSION

Knowledge of the causes and changing trends in causes of childhood blindness would guide public health efforts towards reducing the burden of such blindness in any particular region. Hereditary diseases and cataract are the most common causative factors in childhood blindness in South-East Nigeria. The level of immunization coverage has an impact on avoidable blindness in childhood and our study showed a decline in the contribution of avoidable causes to childhood blindness.

There is need to educate the members of individual communities on the benefits of sustained routine childhood

immunization, the importance of antenatal care and compliance with scheduled visits, the need to supervise children at play and the availability of rehabilitation services for the visually challenged child. Health education efforts should also aim at reducing the social stigma associated with blindness and the fear of surgery in babies and young children. Use of traditional or herbal medications and patronage of “couchers” should also be strongly discouraged.

Finally, there is a need to train more ophthalmologists in the region to acquire higher expertise to manage childhood cataracts and glaucoma. With better results from these specialists, the fear of surgical failure would decline. The constraints of having to travel far distances in the setting of scarce resources to seek pediatric ophthalmic care would also be minimized.

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## Conflicts of interest

There are no conflicts of interest.

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