



## Causes and Magnitudes of Visual Impairment among Children Attending Clinic in Abak, Southern Nigeria

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### Abstract

**Objective:** This study was aimed to determine the causes and magnitudes of visual impairment among children attending eye clinics in a Sub-urban Hospital, Abak, Southern Nigeria.

**Methods:** This was a prospective study where a convenience sampling technique was employed to sample a total of 200 children consisting of 97(48.5%) males and 103(51.5%) females and within the age range of 6 to 17 years. With ethical consent obtained from parents and guardians, data was collected on subjects' history, presenting and best-corrected visual acuities, internal and external ocular conditions. Instruments used involved Snellen's Visual Acuity (VA) Chart, Trial Lens Case (to assess the presenting VA and best-corrected VA), Keeler Direct Ophthalmoscope, and Slit lamp bio-microscope (for internal and external eye examination). Data collected were analyzed using the descriptive statistics and Chi-square inferential statistics of Statistical Package for Social Science (SPSS) Version 25.

**Results:** Out of the 200 children examined, there were abnormalities detected in 105 (52.5%) children, while 95 (47.5%) of them did not present any determined abnormality. The major causes of visual impairment were refractive errors [32 (16.0%)], congenital cataract [25 (12.5%)], and optic nerve atrophy [12 (6.0%)]. The least cause was traumatic cataract (2.0%). Although there was higher occurrence of refractive errors in males [19 (9.5%)] than females [13 (6.5%)], congenital cataract occurred more in females [17 (8.5%)], than males [8 (4.0%)]. The magnitudes were moderate [43(21.5%)], Blindness [22(11.0%)], Severe [9(4.5%)]. Gender and age were not statistically significant.

**Conclusion:** This study showed refractive error as the major cause of visual impairment among children between the ages of 6 to 17 years in Abak and with a significant magnitude leading to blindness. Therefore, early detection and prevention of visual impairment among children through regular eye screening is advocated.

**Keywords:** Causes; Magnitude; Visual Impairment; Children

### Introduction

Blindness in Children is one of the initial five priority areas of the International Agency for the Prevention of Blindness (IAPB) and World Health Organization's (WHO) Vision 2020, The Right to Sight initiative, and a global campaign for the elimination of avoidable blindness by the year 2020. The World Health Organization's report of 2017 estimated that about 19 million children are vision

impaired. Of these, 12 million children are visually impaired due to refractive error and about 1.4 million children have irreversible blindness, requiring access to vision rehabilitation services to optimize functioning and reduce disability [1]. The United Nations International Children's Emergency Fund defines a child as an individual below the age of 18 years [2]. And according to World Health Organization, blindness and visual impairment in children are de-

defined as a group of diseases and conditions occurring in childhood or early adolescence which if left untreated will result in blindness or severe visual impairment with higher prospects of causing permanent damage in life [1]. Visual impairment is the consequence of a functional loss of vision rather than the eye disorder itself. According to World Health Organization (WHO), blindness is defined as the best-corrected vision of less than 3/60 in the better eye or a visual field no greater than 10 in a radius around central fixation. Low vision is defined as visual acuity of less than 6/18 but equal or better than 3/60 or a corresponding visual field loss to less than 20 in the better eye with the best possible correction. Visual impairment includes both blindness and low vision [3]. Visual impairment and blindness among Children are trending global challenges and they affect not only the individual but also their family and the community. It has implications for the child's development, education, social and economic costs to the child, the family, and the society. The management and mitigation of this surge are directly related to the survival of any child [4].

There are hundreds of thousands of blind children in Africa. The estimated number of blind children and visually impaired children in Africa is increasing each year. In developing countries like Ethiopia, Sudan, Cameroon, Nigeria, and Togo, the major causes of visual impairment are either preventable or treatable. Visual impairment among children in Nigeria today is on the increase. Children should obtain immediate and proper eye care to avoid preventable vision loss, which could affect their personality and adjustments in school. Therefore, there is a need for the assessment of the causes of visual impairment among children [5].

The Causes of childhood blindness and visual impairment may be etiological and anatomical. Etiological Causes entail prenatal (i.e. occurring at the time of conception or during the intrauterine period) or postnatal (during or after birth) conditions. Prenatal causes are congenital anomalies like congenital cataracts, retinal dystrophies, congenital glaucoma, retinoblastoma, etc. while Postnatal conditions are those acquired after births which are unusual during infancy like ocular trauma, measles, and keratomalacia. Anatomical causes depend on the most affected part of the eye. Disorders of the globe that lead to visual impairment abound. According to a 2010 revised estimate, there was a 10% decline in the number of children in the world who were blind, to 1.26 million, and this led to fewer blind children in most regions of the world with excep-

tion of sub-Saharan Africa [6]. This study was aimed to determine the causes and magnitude of visual impairment among children attending eye clinics in a Sub-urban Hospital, in Southern Nigeria.

## Materials and Methods

This was a prospective study carried out among children attending eye clinics at a Sub-urban Hospital in Abak, Southern Nigeria. Ethical approval was sought and obtained from relevant authorities. Verbal consent was obtained from the parents and guardians of the subjects. The purpose and methodology of the study were thoroughly explained to them before the examination was carried out. Participants comprised of 200 Children between the ages of 6 - 17 years and sampled using convenience sampling technique for Five months (from 2<sup>nd</sup> November 2019 to 29<sup>th</sup> March 2020). All data and information collected from the participants were used for this study only, and confidentiality of participants' data was ensured. Materials used included Snellen's Visual Acuity chart set at 6 meters to assess participants' visual acuities, Pentorch for external ocular examination and Shadow test, Ophthalmoscope to assess the anterior and posterior segments to identify possible ocular pathologies, Non-Contact Tonometer (NCT) was used in measuring the intraocular pressures, Confrontational visual field examination to assess the extent of the visual field, and Slit lamp biomicroscope was also used to assess the anterior and posterior segments of the eye comprehensively, Retinoscope and Trial lens case accessories for Objective and Subjective refraction respectively. The testing procedure followed a comprehensive case history was taken for patients who came to the eye clinic and informed assent was obtained from parent/guardian to participate in the study. Visual acuities were tested using a Snellen visual acuity chart at a distance of 6 meters. The external eye examination using a Pen torch was carried out and followed by Objective refraction using the Retinoscope. Subjective refraction was performed on patients to acquire their best-corrected Visual Acuity. Internal eye examination was performed afterward using a direct ophthalmoscope and a slit lamp biomicroscope to identify various ocular pathologies. The IOP was measured three times for both eyes using a non-contact tonometer (Nidek NT-2000). The confrontational visual field test was performed using the counting fingers method to determine the extent of their visual field. The results were noted and diagnoses made were recorded appropriately. The Statistical Package for the Social Sciences (SPSS) version 25 was used to analyze the data;  $p \leq 0.05$  was taken to be significant. Frequency and descriptive tables

were generated and the Pearson chi-square was used to explore relationships and associations for variables respectively.

## Results

### Demographic profiles of the participants

The distribution of participants in various age groups is shown below.

Age groups (years)	Frequency (N)	Percentages (%)
6 – 9	59	29.5
10 – 13	80	40.0
14 – 17	61	30.5
Total	200	100.0

**Table 1:** Showing the distribution of participants in the various age group.

The mean age of participants by gender is shown below

Gender (M/F)	Participants (N)	Percentage (%)	Age (years)		
			Range	Mean	SD
Male	97	48.5	6 – 16	11.3	3.1
Female	103	51.5	6 – 17	11.8	2.9
Total	200	100.0	6 – 17	11.6	3.0

**Table 2:** Showing mean ages of participants by gender.

### Causes (%) of visual impairment

The causes are shown in table 3 below.

Cause	Participants (N)	Percentage (%)
No Abnormalities Detected	95	47.5
Refractive error	32	16.0
Cortical visual impairment	9	4.5
Congenital cataract	25	12.5
Albinism	8	4.0
Traumatic cataract	4	2.0
Optic nerve atrophy	12	6.0
Corneal opacities	7	3.5
Others	8	4.0
Total	200	100.0

**Table 3:** Shows the distribution of Causes of visual impairment among Children attending the clinic in Abak.

### Causes (%) of visual impairment about gender

The Causes of gender are shown in table 4 below.

Etiology	Male	Female	Total
No Abnormalities Detected	52 (26.0)	43 (21.5)	95 (47.5)
Refractive error	19 (9.5)	13 (6.5)	32 (16.0)
Cortical visual impairment	3 (1.5)	6 (3.0)	9 (4.5)
Congenital cataract	8 (4.0)	17 (8.5)	25 (12.5)
Albinism	3 (1.5)	5 (2.5)	8 (4.0)
Traumatic cataract	0 (0.0)	4 (2.0)	4 (2.0)
Optic nerve atrophy	5 (2.5)	7 (3.5)	12 (6.0)
Corneal opacities	3 (1.5)	4 (2.0)	7 (3.5)
Others	4 (2.0)	4 (2.0)	8 (4.0)
Total	97 (48.5)	103 (51.5)	200 (100.0)

**Table 4:** Showing the Causes of visual impairment about gender.

### Magnitudes (%) of Visual Impairment

The magnitudes of visual impairment of participants are shown in table 5 below.

Magnitude	Frequency (N)	Percentage (%)	Visual Acuity range
Mild or No VI	126	63.0	-0.2 (6/4) – 0.5 (6/18)
Moderate VI	43	21.5	0.6 (6/24) – 1.0 (6/60)
Severe VI	9	4.5	1.1 (5/60) – 1.3 (3/60)
Blindness	22	11.0	Worse than 1.3 (> 3/60)
Total	200	100.0	-0.2 (6/4) - >1.3 (>3/60)

**Table 5:** Showing the magnitudes of visual impairment of participants.

### The magnitude of visual impairment about gender

The magnitudes of visual impairment about gender are shown in table 6 below.

### Magnitudes of visual impairment among different age groups

The magnitudes of visual impairment among different age groups are shown in table 7 below.

The magnitude of visual impairment	Gender		Total N (%)
	Male N (%)	Female N (%)	
Mild or No VI	61 (30.5)	65 (32.5)	126 (63.0)
Moderate VI	25 (12.5)	18 (19.0)	43 (21.5)
Severe VI	2 (1.0)	7 (3.5)	9 (4.5)
Blindness	9 (4.5)	13 (6.5)	22 (11.0)
Total	97 (48.5)	103 (51.5)	200 (100.0)

**Table 6:** Showing the magnitudes of visual impairment concerning gender.

The magnitude of Visual Impairment	Age (years)			Total
	6 - 9	10 - 13	14 - 17	
Mild or No VI	40 (20.0)	48 (24.0)	38 (19.0)	126 (63.0)
Moderate	14 (7.0)	16 (8.0)	13 (43.0)	43 (21.5)
Severe	3 (1.5)	4 (2.0)	2 (1.0)	9 (4.5)
Blindness	2 (1.0)	12 (6.0)	8 (4.0)	22 (11.0)
Total	59 (29.5)	80 (40.0)	61 (30.5)	200 (100.0)

**Table 7:** Showing categories of visual impairment among different age groups.

### Discussion

There is a global increase in Visual Impairment with varying causes among children in low and mid-income countries. This study was aimed to determine the causes and magnitude of Visual Impairment among children attending eye Clinics at a Sub-urban Hospital in Abak, Southern Nigeria. This was a prospective study where 200 children, with ages ranging from 6 - 17 years, who attended the hospital for eye care services, were sampled within five (5) months. A convenience sampling technique was used to sample the children consisting of 97 (48.5%) males and 103 (51.5%) females. With ethical consent obtained from parents and guardians, data on subjects' history, presenting and best-corrected visual acuities, internal and external ocular conditions were collected.

From the results, out of the 200 children sampled, 105 (52.5%) children had various causes of Visual Impairments, while no abnormalities were detected in 95 (47.5%) of them. The major causes of Visual Impairment among the examined children were Refractive Errors [32 (16.0%)], Congenital Cataract [25 (12.5%)], Optic Nerve Atrophy [12 (6.0%)] and Cortical Visual Impairment [9 (4.5%)]. Other causes were of fewer occurrences. As shown in Table 3, Re-

fractive Error was the major cause of Visual Impairment with a frequency of 32(16.0%). This was in tandem with the results obtained by He., *et al.* [7] in Shanghai China, Hashemi., *et al.* [8] in South East Asia, and Ezelum., *et al.* [9] in Nigeria where the refractive error was one of the major causes of Visual impairment to the proportion of 13.3%, 18.2%, and 11.3% respectively. But it was at variance to that obtained by Naidoo., *et al.* [10] in South Africa, Abah., *et al.* [5] in Zaria, and Megbelayin., *et al.* [11] in Calabar Nigeria which was 1.4%, 8.0%, and 5.2%. A coexistence of Presbyopia with other forms of Refractive errors to the rate of 40.4% was also observed in Uyo Nigeria according to the study by Abraham and Megbelayin [12].

Considering the magnitudes of Visual Impairment, a total of 126 (63.0%) children of the sampled population had mild or no visual impairment, 43 (21.5%) had moderate visual impairment, 9 (4.5%) children had severe visual impairment while 22 (11.0%) were blind, as shown in Table 5. Concerning Gender, there was a higher occurrence of refractive errors in males [19 (9.5%)] than females [13 (6.5%)]. Congenital Cataract was the second most common cause of visual impairment with the highest occurrence in females [17 (8.5%)] than that of males [8 (4.0%)]. Corneal opacities occurred more in females 4(2.0) than males 3(1.5). Cataract due to trauma occurred with female preponderance 4 (2.0) than males [0 (0.0%)]. Except for Refractive errors, the female gender showed a higher preponderance on the various causes of visual impairment. However, the distribution of the causes of visual impairment in males was not significantly different from that of the females ( $X^2(8) = 11.024, p = 0.200$ ), as shown in Table 4. Refractive Error was found in previous studies to be the major cause of visual impairment in females than males, [7,12], this study found that there are no significant differences in the occurrence of refractive errors in males [19 (9.5%)] than females [13 (6.5%)]. More so, concerning age, Refractive Error occurred mostly among children between the ages of 10 to 13 years and has no significant difference between the various age ranges. The highest frequency of 80 (40%) was found among children between the ages of 10 - 13 years and 61 (30.5) were found among children between the age of 14 -17 years. The least frequency 59 (29.5%) was found among children between the ages 6 - 9 years.

### Conclusion

This study shows that Refractive Error is a major cause of avoidable Visual Impairment among children in Abak, Southern Nigeria.

Other causes included Congenital Cataract, Optic Nerve Atrophy, Corneal Opacities, Albinism, traumatic cataract, and cortical visual impairment, and some of these causes are treatable. It also shows a significant relationship between causes of visual impairment among children with age and gender. Strategic intervention for the prevention of visual impairment among children in Abak is advocated. More so, the prevention of visual impairment activities should be integrated into a comprehensive eye care plan and also in the health plan of the country.

### Conflict of Interest

None.

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