



## Original Article

# Causes of Visual Impairment in Children Aged 5 to 15 Years: An Observational Study in Cameroon

*Les causes de déficience visuelle chez l'enfant de 5 à 15 ans:  
Une étude observationnelle au Cameroun*

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## ABSTRACT

**Introduction.** Visual impairment (VI) in children is a public health problem especially in resources limited setting. We aimed to determine the prevalence and main causes of visual impairment in children in two hospitals in Douala, Cameroon. **Methods.** An observational and retrospective study was carried out from January to April 2018 at the general hospital and at the Laquintinie hospital in Douala on the files of children aged 5 to 15 years who consulted from January 2013 to December 2017. The files of Children aged 5 to 15 with a diagnosis of VI (low vision and blindness) were included. Low vision was defined as visual acuity less than 6/18 but better than 3/60. Blindness was defined as visual acuity less than 3/60. Variables collected from patient charts included age, sex, medical history and causes of visual impairment. **Results.** The prevalence of visual impairment was 1.3 %. Boys were affected in 57% of cases and the sex ratio was 1.32. The mean age at diagnosis was  $9.58 \pm 3.6$  years. Low visual acuity (83.7%) and ocular pain (23.3%) were the main presenting complaint. According to the type of visual impairment, 39.5% of children were blind whereas 60.5 % had low vision. A total of 22 children (64.7%) aged 5-9 years were blind. Adolescents were mainly affected by low vision. Glaucoma 16 (18.6%) was the most common cause of VI, followed by cortical blindness (15.1%), severe refractive errors (11.6%) and cataract (9.3%). **Conclusion.** Glaucoma and cortical blindness were the most common causes of visual impairment in children in our setting.

## RÉSUMÉ

**Introduction.** La déficience visuelle chez l'enfant est un problème de santé publique, en particulier dans les pays à ressources limitées. Notre objectif était de déterminer la prévalence et les principales causes de déficience visuelle chez les enfants dans deux hôpitaux à Douala, au Cameroun. **Méthodes.** Une étude observationnelle et rétrospective a été réalisée à l'hôpital Général et l'hôpital Laquintinie de Douala sur les dossiers d'enfants de 5 à 15 ans consultés de Janvier 2013 à Décembre 2017. Les dossiers d'enfants de 5 à 15 ans avec un diagnostic de VI (basse vision et cécité) ont été inclus. La basse vision était définie comme une acuité visuelle (AC) inférieure à 6/18 mais supérieure à 3/60 et la cécité ( $AC < 3/60$ ). Les variables étudiées étaient l'âge, le sexe, les antécédents médicaux et les causes de la déficience visuelle. **Résultats.** La prévalence de la déficience visuelle était de 1,3%. L'âge moyen au moment du diagnostic était de  $9,58 \pm 3,6$  ans. Les motifs de consultation étaient la baisse de l'acuité visuelle (83,7%) et la douleur oculaire (23,3%). La cécité concernait 39,5% des enfants et 60,5% avaient une basse vision. Au total, 22 enfants (64,7%) âgés de 5 à 9 ans étaient aveugles. Les adolescents étaient principalement affectés par la basse vision. Le glaucome était la cause la plus fréquente de déficience visuelle, suivi de la cécité corticale (15,1%), des erreurs de réfraction sévères (11,6%) et de la cataracte (9,3%). **Conclusion** Le glaucome et la cécité corticale étaient les causes les plus fréquentes de la déficience visuelle chez les enfants dans notre contexte.

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**Mots clés :** Déficience visuelle, enfants, adolescents, Douala, Cameroun.

## INTRODUCTION

Visual impairment in children is a public health problem especially in low and middle-income countries. According to WHO, 18 929 million of children under 15 years are visually impaired. At least three-quarter of

affected children live in low income countries [1]. Prevalence of blindness in under-five children is up to 1.5 per 1000 children [2]. Visual impairment can affect neurocognitive development, social interactions and learning abilities during childhood.

Causes of visual impairment widely vary from one region to another according to socio-economic status [2]. The main causes in all countries include cataract, retinal disorders and congenital diseases. In high-income countries, lesions of central nervous system and optic nerve are prevalent. In contrast, corneal scars due to undernutrition or infectious diseases and uncorrected refractive errors are mainly reported in Africa [3–6]. The main causes of visual impairment in Nigeria in 2007 included refractive errors and corneal scars. Omgbwa Eballe et al. mainly reported refractive errors, optic neuropathy and ocular albinism as causes of blindness in a previous study in children aged 6 to 15 years in Cameroon [7].

Common causes of blindness in children are preventable. WHO enhanced specific interventions through vision 2020 program to reduce visual impairment worldwide [2]. A special issue is dedicated to children to preserve vision and improve their quality of life. For better management of this condition, it is essential to identify avoidable causes of visual impairment in our country. We aimed to determine the prevalence and main causes of visual impairment in children in two tertiary hospitals in the Littoral region, Cameroon.

## METHODS

### Study design and setting

We conducted an observational and retrospective study from January 1st to April 30, 2018 in two eye clinics located respectively in the Douala General Hospital and Laquintinie Hospital. These hospitals are the two teaching hospitals of the economic capital of Cameroon. Each eye clinic has five dedicated ophthalmologists, one optometrist and many nurses. We retrospectively reviewed files of children from 5 to 15 years who consulted from January 1, 2013 to December 31, 2017.

### Data collection

We included files of children from 5 to 15 years with diagnosis of low vision and blindness. Incomplete files were excluded. We collected data from patient's files. Variables included age, gender, medical past history and causes of visual impairment. Visual impairment included both low vision and blindness. Low vision was defined as visual acuity less than 6/18 but better than 3/60. Blindness was defined as a visual acuity less than 3/60.

### Data analysis

We used SPSS 20.0 software (IBM Corporation, Chicago, USA) for statistical analysis. Continuous variables are expressed as median with the interquartile range or mean with standard deviation according to their distribution. Categorical variables are presented as proportions, percentages or frequencies. We used Fischer test or Chi square test to compare proportions between groups. A p-value < 0.05 was considered statistically significant.

### Ethical considerations

This study received ethical approval from the institutional board review of the Faculty of Medicine and Pharmaceutical Sciences of Douala. Administrative

approval was obtained from head officers of the two hospitals.

## RESULTS

Out of 6464 records of children reviewed during the study period, 86 of them had visual impairment. The prevalence of visual impairment was 1.3 %. Out of 86 records, boys were affected in 57 % of cases with a sex ratio of 1.32. The mean age at diagnosis was  $9.58 \pm 3.6$  years. Most of these children (79.1%) were living in urban area and 30.2 % of them were not yet attending school.

**Table 1: Baseline characteristics of the study population**

Baseline characteristics	n (%)
<b>Age group (years)</b>	
5-9	42 (48.8)
10-15	44 (51.2)
<b>Gender</b>	
Male	49 (57.0)
Female	37 (43.0)
<b>Level of education</b>	
Not attending school	26 (30.2)
Primary	32 (37.2)
Secondary	28 (32.6)

The main conditions reported in past history included meningitis (8.1 %); Ocular trauma and albinism (7%). A family history of refractive errors and glaucoma was respectively found in 43% and 12.8 % of children. Low visual acuity (83.7%) and ocular pain (23.3%) were the main presenting complaint. According to the type of visual impairment, 39.5% of children were blind whereas 60.5 % had low vision. A total of 22 children (64,7%) aged 5-9 years were blind. Adolescents (age range 10-15 years) were mainly affected by low vision.

Glaucoma was the most common cause of visual impairment. Out of 86 children affected, 16 (18.6%) had glaucoma. Other causes included cortical blindness (15.1%), severe refractive errors (11.6%) and cataract (9.3%). According to WHO classification of vision loss, causes of visual impairment were classified respectively as childhood (15.1%), congenital (15.1%), hereditary (30.3%) and unknown (39.5%) causes.

**Table 2: Etiologies of visual impairment**

Etiologies	n (%)
<b>Glaucoma</b>	16 (18.6)
<b>Cortical blindness</b>	13 (15.1)
<b>Cataract</b>	8 (9.3)
<b>Optic neuropathy</b>	7 (8.2)
<b>Albinism</b>	6 (7.0)
<b>Corneal opacities</b>	6 (7.0)
<b>Amblyopia</b>	5 (5.8)
<b>Refractive errors</b>	5 (5.8)
<b>Optic atrophy</b>	3 (3.4)
<b>Others*</b>	17 (19.8)
<b>Total</b>	86 (100.0)

Others \*: Aniridia, retinoblastoma, microphthalmia, corneal dystrophy, nystagmus, strabismus

Using anatomical classification, 12 of 86 children had normal globes (13.9%), 17 had whole globe lesions (19.8%). The other leading sites were visual cortex and

retina (15.1% respectively), cornea (13.9%) and uvea (9.3%).

Anatomical sites	n (%)
Whole globe	17 (19.8)
Visual cortex	13 (15.1)
Retina	13 (15.1)
Cornea	12 (13.9)
Optic nerve	10 (11.6)
Lens	8 (9.3)
Uvea	1 (1.2)
Normal globe	12 (13.9)
Total	86 (100)

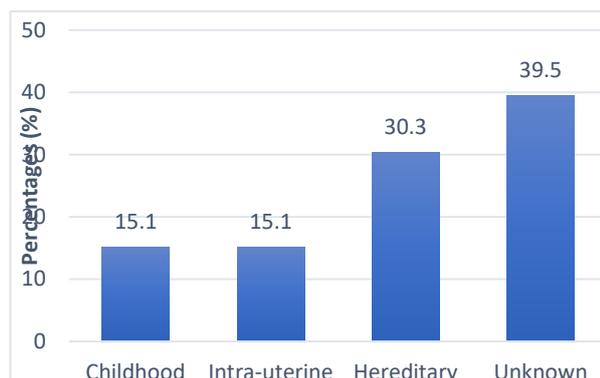


Figure 1: Causes of visual impairment according to WHO classification

## DISCUSSION

### Limitations

The burden of visual impairment in developing countries is well-known. Many causes of this condition can be prevented. We conducted this study to determine the prevalence of this condition and underlying causes in children aged 5 to 15 years in two eye clinics in Cameroon. The results cannot be generalised to all regions of Cameroon. It highlights the main causes of visual impairment diagnosed in children in an urban area. This study provides useful data which can help for decision making in regard with screening and prevention of low vision in children in Cameroon.

### Prevalence of visual impairment

The prevalence of visual impairment among ophthalmic diseases was 1.3% in children below 15 years. Ajaiyeoba et al. also found a similar result in school children in Nigeria [8]. This result is higher than prevalence of 0.35% reported by Migliani et al in 1993 in rural area. This difference could be explained by better accessibility and quality of eye-care services provided in urban areas as Douala compared to rural areas.

### General characteristics of the study population

The sex ratio was 1.32 with 57 % of boys. Gyawali et al. in Eritrea also reported a male predominance with a sex ratio of 1.51% [9]. The higher proportion of boys may be related to priority to healthcare given to boys compared to girls in many African countries.

The mean age at diagnosis was 9.58 +/- 3.6 years and more than 50% of affected children aged from 10 to 15 years. Noche et al. found the same result in a previous study in Cameroon [10]. Gyawali et al. in a hospital-based study reported a mean age of 7.82 ± 5.43 years at presentation [9]. In addition, most of them were adolescents. This may suggest late diagnosis of vision loss in our setting. Late diagnosis may be explained by absence of vision screening programs in preschool children, unawareness of parents and difficult access to eyes clinics due to financial means.

Visual impairment may affect education and learning abilities. In our study, 30.2 % of children were not attending school. In a previous study in Botswana, 92.1% of children didn't attend school [5].

Low vision was mainly identified in our study group. Gyawali et al. in Eritrea also found high prevalence of low vision [9]. This differs from the results of Noche et al. who found a higher prevalence of blindness in a previous study in Cameroon [10]. Their study was conducted in a blind school.

A past history of meningitis was commonly reported in our study. This finding may be related to high prevalence of meningitis in Sub-Saharan Africa [11]. Moreover, Cameroon is part of the African meningitis belt. At least 10 % of survivors may have cortical blindness after bacterial meningitis. Ocular trauma was also present in children in our study. It is the underlying cause of blindness in 1-5 % of children in blind schools [12].

### Causes of visual impairment

Glaucoma was the major cause of visual impairment in our setting. This differs from studies in Nigeria and South Africa who found refractive errors as major cause of visual loss in children and adults [8,13]. Out of 86 patients, refractive errors accounted for 11.6%. This correlates with results in Uganda who showed 11.6 % among school children [14].

According to etiological classification of visual impairment, hereditary causes were more prevalent. Many children were affected during antenatal period. This correlates results reported by Shrestha et al. They found hereditary causes in 29.7% of children [15]. In contrast, childhood causes were mainly reported in Eritrea and most of them were avoidable [9].

According to the anatomical site of lesions, the whole globe was the most affected site in our study. This is different to findings in eastern Africa and Nepal [15,16]. They mainly found corneal lesions. In our study, cornea was the third leading site of vision impairment. Corneal lesions are responsible for two-thirds childhood visual impairment in developing countries. Bella et al. in Cameroon in 2013 reported corneal lesions as underlying cause of visual loss in 50 % of children [12]. These lesions were mainly due to corneal opacities in our study. The visual cortex was the other major site affected leading to cortical blindness. Indeed, cortical blindness was found in 15.1 % of children. This value is higher than 3.1 % found by Gyawali et al. in Eritrea [9]. This difference could be explained by the high prevalence of meningitis in sub-Saharan Africa. It may be endemic in

some countries due to poor immunization and late access to health facilities. According to lens site, cataract was the only lesion found. In Nepal, Shrestha et al found a lower prevalence of cataract (5.9%) as underlying cause of visual loss [15]. Lens related disorders accounted for 12.1 % of affected site in eastern Africa [16].

The retina was affected in 15.1 % of children. The underlying diseases included albinism, retinoblastoma and retinal dystrophia. Verzoni et al found retinal lesions as the major cause of visual impairment [17]. At least 30 % of children in their series had retinopathy of prematurity. It is an emerging condition in our context. Its incidence may increase with improved facilities for preterm babies. It is mainly found in very preterm babies (Gestational age <32 weeks) [18]. We didn't found this condition in our study group.

Globe deformities including microphthalmia and aniridia were found in less than 2% of affected children. This result is lower than 10 % of deformities found by Verzoni et al [17]. The optic nerve was mainly affected by atrophy and neuropathies related to trauma. This result correlates those of Gaywali et al. who mainly found optic atrophy as optic nerve lesion [9].

A normal globe was mainly found in children with myopia, nystagmus and strabism as previously reported by other studies [8,13,19].

## CONCLUSION

Visual impairment affects children aged 5 to 15 years in our context. Hereditary causes as glaucoma and cataract are more prevalent. Some avoidable conditions such as refractive errors, ocular trauma and cortical blindness are also found. Preventive care should be addressed for avoidable conditions. This study indicates the need to initiate screening of preschool children for early diagnosis and management of hereditary causes that may lead to blindness.

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## Conflict of interest

No conflict of interest

## Author's contributions:

CIP, RMB, GEM and AE designed the study and data collection tools. GEM, CIP, RMB, PEE, CE, FSB contributed to data collection and statistical analysis. CIP, RMB, GEM, PEE, CE, FSB, AE were involved in bibliographic research. CIP, RMB, GEM, FSB, ELM and AE prepared and revised the manuscript. All authors read and approved the final manuscript.

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