

# Causes of Childhood Blindness and Visual Impairment in Northern Nigeria

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## Abstract

Childhood blindness and visual impairment pose significant public health challenges in Northern Nigeria, where prevalence rates range from 0.3 to 1.2 per 1,000 children. This review highlights the major causes and public health significance of these conditions in the region. Corneal diseases are the leading anatomical causes of blindness, while refractive errors dominate cases of visual impairment. Contributing factors include inadequate healthcare infrastructure, limited trained personnel, and poor public health awareness. Additionally, perinatal and preventable conditions such as vitamin A deficiency and measles play a significant role. Key findings from eight studies across Northern Nigeria reveal that up to 86.6% of childhood blindness could be avoided through preventive and treatment measures. However, significant gaps persist in healthcare delivery, vaccine coverage, and community awareness. Strategies such as improved healthcare infrastructure, expanded training programs, and enhanced public health interventions are essential to address these challenges. This paper emphasizes the critical need for coordinated efforts among healthcare providers, policymakers, and communities to reduce the social and economic burden of childhood blindness and improve affected children's quality of life.

**Keywords:** childhood; blindness; visual impairment; Northern Nigeria

## Introduction

Visual impairment occurs when any eye condition affects the visual system and its function and may be categorized as distance and near visual impairment (Adelson et al., 2021). Globally, an estimated 2.2 billion people suffer from a near or distant visual impairment (VI), mainly caused by refractive errors or cataracts (Adelson et al., 2021; Yekta et al., 2022). Unfortunately, over 80% of vision impairment is found among the underserved population in low- and middle-income countries, (Adelson et al., 2021) with an attendant significant impact on the socio-economic status of these countries. Blindness in children can have a significant impact on their early and long-term psychosocial and intellectual development. Currently, an estimated 450 million children have a form of visual impairment, and 90 million are blind. (IAPB, 2025). Sub-Saharan Africa, including Northern Nigeria, bears a disproportionate share of the burden. The prevalence of childhood blindness in this region is estimated to range between 0.3 and 1.2 per 1,000 children, (Eze et al., 2024) reflecting an interplay of socioeconomic, cultural, and environmental factors. Understanding the underlying causes of childhood blindness and visual impairment is crucial to developing effective prevention and

treatment strategies. This paper reviews the major causes of childhood blindness in Northern Nigeria, highlighting their risk factors and interventions. It also underscores the need for robust healthcare systems and public health policies tailored to the region's unique challenges.

## Statement of the Problem

Children are the future workforce of a nation; hence, all efforts need to be put in place to ensure that they remain in good health and wellbeing. There is a growing proportion of children under 18 years in the overall population of Nigeria. Current UNICEF data estimated the 2023 population of children under 18 years of age in Nigeria to be 110,797,959, which is about half of the country's population (Statista, 2023; UNICEF, 2024). Despite the significant burden of childhood blindness in Northern Nigeria, there is limited progress in addressing the issue. Factors such as inadequate healthcare infrastructure, lack of trained personnel, and poor public health awareness hinder effective prevention and treatment efforts. Moreover, existing data on childhood blindness is fragmented, complicating policy formulation and resource allocation.

## Objectives

This seminar paper aims to determine the causes of blindness and visual impairment among children in Northern Nigeria. The specific objectives are: To determine the anatomic part of the eyes that cause blindness and visual impairment. To study the aetiologic causes of childhood blindness and visual impairment. To make recommendations on public health measures that will mitigate the identified causes of childhood blindness and visual impairment in Northern Nigeria.

### Inclusion Criteria

All primary cross-sectional studies reporting the causes of visual impairment in Nigerian children under 18 years between 2003 and 2022 were included in this review. Such studies that range from community surveys such as key informant studies were included. Studies not in English, grey literature, letters to editors, or editorials were excluded from this review. Community-based studies were ranked high because they give a better representation of the general population (K Kalua et al., 2009; Mohammad A Muhit et al., 2007). Clinic-based and blind school studies included mainly provided more detailed causes of blindness and visual impairment.

## Literature Review

### Childhood Blindness and Visual Impairment

The World Health Organization (WHO) defines blindness as visual acuity (V.A) less than 3/60 in the better eye with available correction (presenting V.A);

**Table 1:** WHO Classification Childhood Blindness.

Anatomical Site of Abnormality	Aetiological Category
Whole Globe	Hereditary
Cornea	Intrauterine
Retina	Perinatal /Neonatal
Lens	Infancy /Childhood
Uvea	Unknown
Optic nerve	
Others	

### Public Health Significance of Childhood Blindness

Childhood blindness is one of the five diseases prioritized in phase I of Vision 2020 initiative. Unlike blindness in adults, about 50% of all childhood blindness is avoidable (Pararajasegaram, 1998) The rationale for prioritising childhood blindness in Vision 2020 are as follows: (C Gilbert & Muhit, 1998)

1. Many of the causes of childhood blindness are preventable at community level.

severe visual impairment (SVI) as V.A from 3/60 to lower than 6/60 and visual impairment as V.A from 6/60 to lower than 6/18 while V.A equal to 6/18 and above is defined as normal vision. (W H O, 1998). The World Health Organisation (WHO) defines a child as a person aged 0-15years. (Clare Gilbert & Awan, 2003).

### Prevalence of Childhood Blindness in Northern Nigeria

Studies indicate that Northern Nigeria has one of the highest burdens of childhood blindness in the country. A study by (Abdull et al., 2009) reported a prevalence of 0.9 per 1,000 children, while more recent studies show a range of 0.3 to 1.2 per 1,000 children (Eze et al., 2024). This high prevalence is attributed to poverty, limited access to healthcare, and inadequate health education (Courtright et al., 2011).

### Causes of Childhood Blindness and Visual Impairment

The WHO classified the causes of childhood blindness into two categories: Anatomical and aetiological. (Rahi et al., 1999) The anatomical way considers the most affected part of the eye - retina, cornea, lens, whole globe, or optic nerve - and is useful as information can be collected on all children. The aetiological classification, on the other hand, is useful for preventive measures in large scale in a population but obtaining reliable data is more difficult. (Rahi et al., 1999).

- Blind years due to childhood blindness is strongly related to social, economic and emotional cost to parents, the child and the communities.
- Blinding conditions are also causes of childhood mortality (e.g., vitamin A deficiency, measles, meningitis, rubella).
- The importance for early detection and treatment for children to avoid irreversible amblyopia.
- The challenge for examination, assessment and management for the disease.

## Results

The literature search was conducted and eight studies were found to have fulfilled the inclusion criteria. These studies were reviewed for this seminar. Four Community based studies, all studies were key informant studies. (Abdullahi, 2012; Ajige et al., 2022; Muhammad & Ali, 2014; Muhammad et al., 2010) Two Blind school-based studies, all the schools were domiciled in Northern Nigeria (Abah et al., 2013; Perpetua, 2005) Two Hospital-based studies,

the hospitals were primarily dedicated as specialist eye hospitals. (Ezinne et al., 2018; Olatunji et al., 2009). The reviewed studies covered all the three geopolitical zones of Northern Nigeria and spanned seven states of the region.

- Nasarawa and Plateau states - North Central
- Yobe and Bauchi states - North East
- Kano, Kaduna and Sokoto states - North West

The tables below depict the findings from the reviewed studies.

**Table 2:** Community Surveys-Blindness. Corneal diseases appear to be the highest anatomical cause of blindness in these community-based surveys.

S/N	Reference	Number of Participants	Anatomical Causes %	Aetiological Causes
1	Ajige JL, 2022. Nasarawa, NC	50	Cornea-50	Hereditary-12.5
			Lens-25	Perinatal-50
			Optic N-12.5	Childhood-12.5
			Cortical-12.5	Unknown-25
2	Nasiru M, 2014. Sokoto, NW	60	Cornea-8	-
			Lens-36	
			Optic N-18	
			Retina-10	
			Cortical-8	
3	Abdullahi A, 2013. Yobe, NE	67	Cornea-48.9	Hereditary-3
			Lens-21.3	Intrauterine-6
			R/Error-10.6	Neonatal-9
			Optic N-2.1	Postnatal-56.7
			W/Globe-17	Unknown-25.3
4	Nasiru M, 2010. Sokoto, NW	58	Cornea-55	Hereditary-10
			Lens-15	Childhood-75
			Uvea-10	Unknown-10
			W/Globe-20	Couching-5

**Table 3:** Community Surveys-Visual Impairment. Refractive error featured as the consistent cause of visual impairment amongst children of Northern Nigeria.

S/N	Reference	Number of Participants	Anatomical Causes %	Aetiological Causes %
1	Ajige JL, 2022. Nasarawa, NC	50	Cornea-12.5	Hereditary-12.6
			Lens-12.5	Perinatal-6.3
			R/Error-56.3	Childhood-12.5
			Retinal-6.2	Unknown-68.6
			W/Globe-12.5	
2	Nasiru M, 2014. Sokoto, NW	60	Cornea-21	-
			Lens-21	
			R/Error-47	
			Optic N-11	
			Cornea-15	
			Lens-5	
			R/Error-75	
3	Abdullahi A, 2013. Yobe, NE	67	Cornea-15	-
			Lens-5	
			R/Error-75	

			Optic N-5	
4	Nasiru M, 2010. Sokoto, NW	58	Cornea-44.4	Hereditary-44.4
			Lens-11.1	Childhood-55.6
			R/Error-44.4	

**Table 4:** Blind School Studies-Blindness/Visual Impairment. Lens related causes such as cataract are the commonest causes identified in blind school studies. Corneal causes are equally significantly high.

S/N	Reference	Number of Participants	Anatomical Causes %	Aetiological Causes %
1	Abah ER, 2013. Kaduna, NW	71	Cataract-25.3 Trauma-16.9 Cornea-9.9 Retina-12.7 Optic N-12.7 Buphthalmos-12.7 Rubella-9.9	-
2	Odugbo P, 2005. Bauchi (NE), Plateau (NC), Kaduna (NW)	181	Cornea-20 Lens-29 W/Globe-26	-

**Table 5:** Hospital Based Studies-Blindness. Cataract top the list as the prominent cause of blindness and visual impairment in one study, however corneal causes are highest in the other.

S/N	Reference	Number of Participants	Anatomical Causes %	Aetiological Causes %
1	Ngozika EE, 2015. NEC Kaduna (NW)	2145	Cataract-19.3 Glaucoma-3.8 R/error-2.1 Retina-5.2 Cornea-2.1 Trauma-4.3	-
2	Olatunji F., EEH, Kano (NW)	31	Cornea-54.8 Lens-12.9	Hereditary-6.4 Perinatal-6.4 Childhood-32.3 Unknown-51.7

**Table 6:** Avoidable (Preventable + Treatable) Versus Unavoidable Causes. Both blindness and visual impairment are caused by diseases that are avoidable (preventable and treatable).

S/N	References	Blindness			Visual Impairment		
		Treatable	Preventable	Unavoidable	Treatable	Preventable	Unavoidable
1	Ajige JL, 2022. Nasarawa, NC	25	62.5	12.5	87.5	6.2	6.2
2	Abdullahi A, 2013. Yobe, NE	47.8	38.8	13.4	-	-	-
3	Nasiru M, 2010. Sokoto, NW	20	80	0	56.6	44.4	0
4	Abah ER, 2013. Kaduna, NW	25.3	26.8	47.9	-	-	-
5	Odugbo P, 2005. Bauchi (NE), Plateau (NC), Kaduna (NW)	29	38	33	-	-	-
6	Ngozika EE, 2015. NEC Kaduna (NW)	68	15.3	25.2	-	-	-
7	Olatunji F., EEH, Kano (NW)	19.2	38.4	41.4	-	-	-

## Discussion

The findings obtained in this review are insightful and of importance to clinical and public health research, practice, and policy.

### **Anatomical Causes of Blindness**

Corneal abnormality was the commonest cause of blindness identified in this review. In other community-based studies using KIs in Nigeria, similar results were obtained with corneal abnormality as the leading cause (Aghaji et al., 2017; Duke et al., 2013). However, in other parts of Africa and Asia, lens related pathologies (cataract and pseudophakia) took the lead as the major cause of CB. The reports from Malawi, Ethiopia, and Bangladesh showed lens abnormality contributed 35%, 33.3% and 32.5% of total childhood blindness respectively (Demissie & Solomon, 2011; Khumbo Kalua et al., 2008; M A Muhit et al., 2007). Better measles immunization coverage and vitamin A distribution to children were the reasons for the reduction of corneal blindness in those regions. (Courtright et al., 2011; Pararajasegaram, 1998). Some studies in Nigeria reported corneal opacities and vitamin A deficiency (VAD) as the leading cause of childhood blindness (Muhammad et al., 2010; Rabiou & Kyari, 2002). The prevalence of these aetiological factors has profoundly decreased over time due to the implementation of public health policies that had tackled vitamin A deficiency by improving uptake of vitamin A in different parts of Nigeria, and fortification of foods in Nigeria with vitamin A (Courtright et al., 2011). Lens related causes are the second leading anatomical cause of blindness. Congenital cataract has started emerging as one of the leading causes of childhood blindness in the poor and very poor countries. Recent studies on childhood blindness in Bangladesh and Malawi confirm this finding. This is similar to the results from south-eastern Nigeria (Ezegwui et al., 2003). Refractive error is not a major cause of blindness in children but is one of the common causes of low vision (Adelson et al., 2021; Flaxman et al., 2017). Globally around 12.8 million children between 5-15 years of age have visual impairment as a result of uncorrected or inadequately corrected RE making the global prevalence of refractive error in children 0.96% (W H O, 1998). In a study in south-eastern Nigeria, however, refractive error was the cause of loss of vision in about 59% of those children between 5 and 15 years of age. The children with RE in Ethiopian study were all having significantly high myopia (10-12D) with no amblyopia (Demissie & Solomon, 2011).

### **Aetiological Causes of Blindness**

In this review, most studies reported causes with “unknown” aetiology. There is no comparable uniformity in reporting definitive causes in the reviewed studies. The other identified causes were mainly perinatal causes. A common denominator in these areas is low coverage of measles immunization.

### **Avoidable and Unavoidable Causes of Blindness**

Nearly 50% of the world's childhood blindness is avoidable (Ajibode, 2003). Majority of the studies reviewed here reported that most childhood blindness was due to avoidable causes and those children are therefore needlessly blind. Cataract and glaucoma are treatable; refractive errors are amenable to corrective glasses whereas most of the factors responsible for corneal blindness are preventable with appropriate measures directed to the community including health education, antenatal care and immunization. Studies done in other developing countries using the key informant methods are consistent, with majority causes being avoidable. (Khumbo Kalua et al., 2008; K Kalua et al., 2009; M A Muhit et al., 2007). A blind school study done in south-eastern Nigeria 74.5% causes there were avoidable (Ezegwui et al., 2003). In Iran, however, the avoidable causes are just over half, 51.9% (Razavi et al., 2010). Robust preventive interventions and policies could have aborted many children from being needlessly blind (Pararajasegaram, 1998). The majority causes of unavoidable blindness in other studies are mainly retinal diseases (Demissie & Solomon, 2011; K Kalua et al., 2009; Razavi et al., 2010). Perinatal factors are mainly implicated in the reviewed studies. Iranian findings were retinal dystrophies e.g., Lebers congenital amaurosis were attributed to consanguineous marriages (Razavi et al., 2010). The practice of consanguineous marriages is common in northern Nigeria. Future studies need to rigorously examine children with childhood blindness, perhaps most of what was lumped as unknown may be unraveled.

### **Health System Gaps**

The healthcare system in Northern Nigeria is characterized by inadequate facilities, a shortage of ophthalmologists, and limited access to essential medications. Many rural communities lack primary eye care services, forcing families to rely on untrained practitioners (Courtright et al., 2011). Cataract blindness is largely both preventable and avoidable.

Good-quality cataract surgery is the only acceptable intervention available for the prevention/elimination of cataract blindness across all age groups. Cataract surgery is a bit more challenging in children because of the nature of the paediatric eye, tissue inflammation, post-surgery visual rehabilitation and other peculiarities related to the postoperative care in children (Razavi et al., 2010). This explains why after basic ophthalmic training, there is a special training for paediatric ophthalmology to optimize the surgical outcomes. This further justifies the need to train more eye care workers to cover the existing eye care manpower gap in Nigeria.

### Nutritional Deficiencies

Vitamin A deficiency is both a cause and a consequence of malnutrition, particularly in conflict-affected areas. Large-scale vitamin A supplementation programs have shown some success, but coverage remains inconsistent (Muhammad et al., 2010; Rabiou & Kyari, 2002).

### Infectious Diseases

Ongoing efforts to control infectious causes of blindness, such as trachoma and measles, are undermined by vaccine hesitancy and poor sanitation (Mpyet, 2010). The SAFE strategy (Surgery, Antibiotics, Facial cleanliness, and Environmental improvement) for trachoma control has shown promise but requires sustained implementation.

### Role of Education and Advocacy

Educational programs targeting parents, teachers, and community leaders are essential to reduce preventable blindness (Ajibode, 2003). Advocacy campaigns can also help dispel myths and promote early healthcare-seeking behaviors.

### Genetic and Congenital Conditions

Improved antenatal care and genetic counseling services are critical to addressing congenital causes of blindness (Kong et al., 2012). However, these services are often unavailable or inaccessible to most families in the region.

### Recommendations

1. Strengthen Healthcare Infrastructure: Develop and equip primary eye care centers in rural and underserved areas.
2. Expand Training Programs: Increase the number of trained ophthalmologists and other eye care professionals through targeted training initiatives.

3. Promote Preventive Interventions: Implement comprehensive vaccination programs, vitamin A supplementation, and public health campaigns.
4. Enhance Community Engagement: Engage local leaders and traditional healers in awareness campaigns to change harmful cultural practices.
5. Multi sectoral Approach: Liaison with ministry of Health and ministry of Education needs to be done to identify ways of how these identified blind children can go to school and come up with ways which will ensure that in future all blind children attend school. Integrated schools should be set up in rural areas to cater for the rural community. This necessitates the training, deployment and motivation of the 'multi-tasked' special care teachers.
6. Improve Data Collection: Establish regional eye health registries to monitor the prevalence and causes of childhood blindness.

### Conclusion

Childhood blindness in Northern Nigeria is a multifaceted issue requiring coordinated efforts from healthcare providers, policymakers, and community stakeholders. Corneal diseases and cataract are the leading causes whereas refractive errors were the leading cause of visual impairment. While progress has been made in some areas, significant challenges remain. Addressing these challenges will require sustained investments in healthcare infrastructure, capacity building, and public health education. By prioritizing the prevention and treatment of childhood blindness, Northern Nigeria can reduce the social and economic burden of visual impairment and improve the quality of life for affected children.

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