Original Article

Childhood Blindness and Visual Impairment in a Local Government Area in North-Central Nigeria: A Key Informant Survey

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Abstract

Background: To use the Key Informant survey to estimate the magnitude and to identify the major causes of blindness and severe visual impairment in children of Nassarawa Eggon Local Government Area of Nasarawa State, Nigeria.
Methodology:T wenty-eight trained Key Informants traced and referred children believed to be blind or visually impaired. Biodata record, history and eye examination were based on the operational definitions in the WHO/PBL coding instruction manual for childhood blindness. Data were entered and analyzed in the WHO/PBL Childhood Blindness Software (CBS) V 1.2.75 by an ophthalmologist and a statistician.
Result: The Key Informants identified 51 children of which 50 (98%) were examined. Eight (16%) of the children examined were blind, another 8 (16%) had severe visual impairment, 16 (32%) were visually impaired, 7 (14%) had monocular blindness and 11 (22%) were normal. The estimated crude prevalence of childhood blindness was 0.01% and of moderate-severe visual impairment was 0.03%. The major causes of blindness and severe visual impairment were cataract, corneal opacity and refractive errors. Ninety-four percent of the causes of blindness and moderate-severe visual impairment in children were avoidable. It was estimated that some 415children in Nasarawa state are blind or have moderate to severe visual impairment.
Conclusion: The estimated magnitude of blindness and visual impairment in Nassarawa Eggon LGA is 8 and 24 children respectively with a crude blindness prevalence of 0.01% (1 per 10,000). Cataract was the commonest cause of childhood blindness and severe visual impairment in Nassarawa Eggon local government area with 93.8% of the causes of blindness and visual impairment being avoidable.
Keywords: Key Informants; Childhood Blindness; Visual Impairment; Childhood Cataract; Avoidable Blindness.

Introduction

The control of childhood blindness is a priority of the World Health Organization's VISION 2020: the Right to Sight[1]. The number of 'blind-years' due to childhood blindness ranks 2nd to adult cataract; and approximately one-third of the entire economic burden of blindness is incurred by childhood blindness[1].

A population-based survey for childhood blindness will be impractical due to the rarity of the condition and consequent high cost[2]. The Key Informant (KI)

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Access this article online
Quick Response Code:
Website: www.nigerianmedjournal.org

How to cite this article: Ajige JL, Muhammad N, Hassan-Wali A. Childhood Blindness and Visual Impairment in a Local Government Area in North-Central Nigeria: A Key Informant Survey. Niger Med J 2022;63;(1): 10-15

survey has been successfully carried out in many developing countries[3-8] to estimate magnitude and causes of childhood blindness. The KIs are volunteers who know their community well, whether through their occupational or social roles[9].

Nassarawa Eggon is one of 13 LGAs of Nasarawa State, Nigeria. Children aged 15 years or less constitute 42.6%[10]of the estimated total population of 194,482 in the LGA. The aim of this study was to provide data on childhood blindness and visual impairment in Nassarawa Eggon Local government area (LGA) of Nasarawa State, North-Central, Nigeria. The specific objectives were to estimate the magnitude of childhood blindness and visual impairment in Nassarawa Eggon LGA; and to identify the major causes of childhood blindness and visual impairment in Nassarawa Eggon LGA using the key informant survey.

Materials and Methods

Design.

This was a population–based key informant survey. Key Informants were trained to trace and refer children believed to be blind or visually impaired for examination in the months of October and December 2015.

Ethical consideration.

Ethical approval was by the Human Research and Ethics Committee of the National Eye Center, Kaduna (CMAC/2015/001). The study adhered to the Tenets of the Helsinki declaration. Local authorities granted permission for the study. Written informed consent for examination was obtained from parents/guardians.

Mobilization of communities, study team and data collection procedure. The following steps were taken over a 6-week period.

Sensitization. Local Authorities including traditional leaders were sensitized on the goal of the survey to solicit their support and mobilization of the population to participate in the study. A community mobilizer (an ophthalmic nurse) and key informants were selected and venue and dates for eye examination were agreed. Dates for survey team training, tracing and referral of the children were also fixed. Because of the terrain in the LGA, 3 venues were selected for eye examination.

Training of key informants and community mobiliser.

The training of key informants covered blindness and its causes in children; benefits of treatment (surgical, medical or optical); methods of tracing blind or visually impaired children in the communities; assessment of vision in children; data recording; and team work.

The teaching methods included didactic lectures, group discussions, and practical demonstrations in one of the communities within the LGA. The KIs were supplied a notebook, pen and 20 referral forms each. At the end of the training, the KIs were provided with details of dates for eye examination based on proximity to one of the 3 venues.

Two key informants were assigned to each ward in the LGA. They were asked to record and refer any child believed by the guardians/parents, to be blind or have problems with vision.

The community mobiliser was additionally introduced to the WHO/PBL eye examination record for children with blindness and low vision and its operational definitions[11]. The focus was on how to fill section B of the data collection tool providing personal details of each child to be examined.

Case finding & health communication. Two weeks was used for health communication, case finding and referral. The traditional leaders (through town criers) and KIs spread the message that case detection of visually impaired children was on-going. Community members, teachers and parents cooperated by reporting any child or pupil believed to be blind or visually impaired to the community leader or a nearby health facility. The KIs visited the traditional leaders' and/or parents' home and recorded the names of the identified children into a register and the parents/guardians were given appointment at the nearest exam venue and date.

Supervisory visits. Each KI had a supervisory visit by the ophthalmologist and the community mobilizer during the case finding stage. Progress and challenges encountered were discussed and solutions proffered. A random selection of recorded

addresses of some children was checked to verify completeness and accuracy.

Eye examination. The children brought to the examination venue on the appointment days were examined by a team comprising the ophthalmologist and community mobilizer supported by the KIs working in the facilities. The ON recorded the personal details of each child to be examined including history of consanguinity. The ophthalmologist obtained additional history of previous eye surgery and then checked the presenting distance visual acuity (VA) of each child. Each eye was tested separately and then binocularly using the tumbling E or the picture chart in children demonstrating an ability to use either of the charts. Correctly identifying 4 consecutive showings was considered passing an acuity line. Alternatively, 5 of 6 or 6 of 8 showings were considered as correctly identifying an acuity line. Any eye that failed 6/18 optotype had pinhole acuity tested. Children, who could not be tested with an E chart due to age or disability, were assessed as either 'believed sighted' or 'believed blind' using an ability to fixate and follow light.

Functional vision was then assessed with both eyes open by observing if the child recognized familiar faces, walked, crawled freely, or had navigational vision only. Parents and guardians were interviewed concerning the child's functioning where this could not be assessed during examination. Although visual field assessment was an option in this methodology, it could not be assessed in this study due to resource constraint. Each child had a general assessment for any additional disability.

A basic eye examination was conducted for evidence of previous eye surgery, and for any anatomical abnormality with the whole globe, anterior segment or posterior segment structures.

The examination was conducted using a pen-torch and a magnifying loop for anterior segment exam, and the direct ophthalmoscope for posterior segment examination.

Refraction was conducted by the ophthalmologist in children with normal eye exam, whose VA improved with pinhole. Near vision assessment was then performed on all children able perform the test unaided or with correction using matching test with the 5mm lea symbols provided on the data collection tool.

The ophthalmologist then determined the possible anatomical sites contributing to visual loss for each eye and then the major cause of the visual loss for the child. Where there is more than one site, the main contributing site to visual loss was considered as the major cause. Where two or more sites contribute equally to visual loss the preventable or treatable is considered the major cause. When neither abnormality is preventable or treatable, the first to occur was considered as the major cause[12].

The ophthalmologist also determined the etiological cause of visual loss for each eye and then for the child using the details of history obtained and eye examination findings. Etiological causes were attributed to hereditary, intrauterine, perinatal/neonatal, or to postnatal/infancy /childhood factors. Only one factor was chosen for each eye and then for the child. For those that no significant history or examination findings were obtained, the etiology was classified as unknown[12].

Appropriate spectacle prescription was given to parents/guardians of those children whose VA improved with refraction.

The parents of children that required referral had counseling and then referral to the nearby Jos University Teaching Hospital, Jos, Plateau State. Patients with minor infective and allergic eye ailments were treated with chloramphenicol and antazoline-tetrahydrozoline eye drops respectively.

Data management.
The data was analyzed with the WHO Childhood Blindness Software (CBS) Ver 1.2.75 setup (2008) designed in Epiinfo 6[12]. Entry was made by the ophthalmologist with a statistician support. Results were presented intext, tables and figures.

Results

Twenty-eight KIs whose ages ranged from 22 to 52 years(mean 33.8 years)were trained for this survey. Nine (32%) of the KIs were females. The KIs identified and referred 51 children for examination.

A total of 50 (98%) children wereexamined,27 (54%)of whom were boys. Some children known to be blind were not included in the number referred as they attend school for the blind in a neighboring State. The children examined were aged 1 to 15 years (mean8.8 years).

Presenting visual status of the children.
The presenting vision status was visual impairment (VI) category in 16 (32%) of the children. Eight children (16%) each had severe VI and blindness respectively while an additional 7 children (14%) were diagnosed with monocular blindness.

Causes of visual impairment and blindness.
The commonest cause of visual impairment was refractive error while that of blindness was corneal scar, table I.

Table 1: Causes of visual impairment and blindness.

Causes	Monocular blindness n (%)	Visual impairment n (%)	Severe visual impairment n (%)	Blindness n (%)
Refractive error	0 (0)	9 (56.3)	3 (37.5)	0 (0)
Cataract	1 (14.3)	2 (12.5)	3 (37.5)	2 (25)
Corneal scar	2 (28.6)	1 (6.3)	0 (0)	4 (50)
Glaucoma	0 (0)	2 (12.5)	1 (12.5)	0 (0)
Disorganized globe	2 (28.6)	0 (0)	0 (0)	0 (0)
Cortical blindness	0 (0)	0 (0)	0 (0)	1 (12.5)
Staphyloma	1 (14.3)	0 (0)	0 (0)	0 (0)
Keratoconus	0 (0)	1 (6.3)	0 (0)	0 (0)
Phthisis bulbi	1 (14.3)	0 (0)	0 (0)	0 (0)
Macular Scar	0 (0)	0	1 (12.5)	0 (0)
Retinal Dystrophy	0 (0)	1 (6.3)	0 (0)	0 (0)
Optic nerve Hypoplasia	0 (0)	0 (0)	0 (0)	1 (12.5)
Total	7 (100)	16 (100)	8 (100)	8 (100)

The commonest anatomical site of abnormality leading to severe visual impairment was the lens (37.5%) whereas cornea (50%) was the commonest site for blindness, table II. Much of the underlying causes for all visual impairment were of unknown etiology, table II and figure 1. Most causes for all categories of visual impairment were treatable (87.5%) while that of blindness was largely preventable (62,5%), table 2. Corneal scar and disorganized globe (57.2%) were the leading causes of monocular blindness.

Table 2: Anatomical site abnormality and the underlying causes of childhood visual impairment and blindness.

	Visual impairment n (%)	Severe visual impairment n (%)	Blindness n (%)	Total n (%)
Anatomical site				
Cornea	2 (12.5)	0 (0.0)	4 (50)	6 (18.8)
Cortical blindness	0 (0.0)	0 (0.0)	1 (12.5)	1 (3.1)
Lens	2 (12.5)	3 (37.5)	2 (25)	7 (21.9)
Optic nerve	0 (0.0)	0 (0.0)	1 (12.5)	1 (3.1)
Refractive error	9 (56.3)	3 (37.5)	0 (0.0)	12 (37.5)
Retina	1(6.2)	1 (12.5)	0 (0.0)	2 (6.3)
Whole globe	2 (12.5)	1 (12.5)	0 (0.0)	3 (9.4)
Total	*16 (100)*	*8 (25.0)*	*8 (100)*	*32 (100)*
Underlying cause				
Hereditary factors				
Autosomal recessive	1 (6.3)	0 (0)	1 (12.5)	2 (6.3)
Autosomal dominant	1 (6.3)	0 (0)	0 (0)	1 (3.1)
Intrauterine factor				
Toxoplasmosis	0 (0)	1 (12.5)	0 (0)	1 (3.1)
Perinatal/Neonatal factors				
Ophthalmia neonatorum	1 (6.3)	0 (0)	3 (37.5)	4 (12.5)
Cerebral injury	0 (0)	0 (0)	1 (12.5)	1 (3.1)
Postnatal/ Childhood factors				
Trauma	0 (0)	0 (0)	0 (0)	0 (0)
Measles	0 (0)	0 (0)	1 (12.5)	1 (3.1)
Cannot determine (unknown etiology)				
Refractive error	9 (56.3)	3 (37.5)	0 (0)	12 (37.5)
Cataract	2 (12.5)	3 (37.5)	2 (25)	7 (21.9)
Glaucoma	2 (12.5)	1 (12.5)	0 (0)	3 (9.4)
Total	*16 (100)*	*8 (100)*	*8 (100)*	*32 (100)*
Avoidable/Unavoidable				
Preventable	1 (6.2)	1 (12.5)	5 (62.5)	7 (21.9)
Treatable	14 (87.5)	7 (87.5)	2 (25)	23 (71.9)
Unavoidable	1 (6.2)	0 (0)	1 (12.5)	2 (6.2)
Total	*16 (100)*	*8 (100)*	*8 (100)*	*32 (100)*

The most common underlying etiologic factor causing childhood blindness was perinatal factors while the main factor for all categories of visual impairment were of undetermined cause, figure 1.

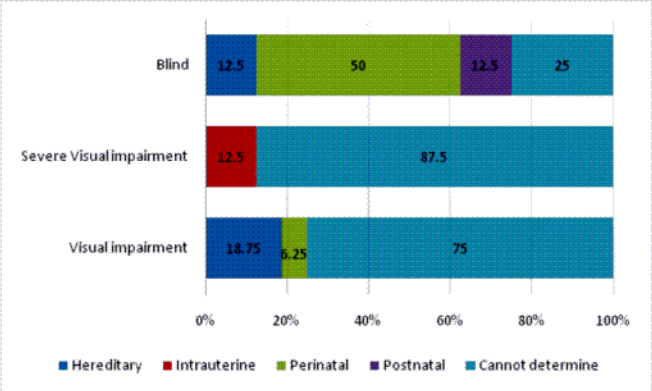

Figure 1: Underlying factors leading to childhood visual loss in the study area.

Magnitude of blindness in the study area.
A total of 8 children were found to be blind in the study area and an additional24children were visually impaired. With a population aged 16 years

or less of 82,266,the estimated crude prevalence of childhood blindness in the study area was 0.01% (1 per 10,000) while that of visual impairment was 0.03% (3 per 10,000).

Extrapolating the crude prevalence to the 2015 reference population of 1,036,261 gives an estimated magnitude of 104 blind children and 311 visually impaired children in Nasarawa State.

Discussion

This study was the first of its kind in Nassarawa state and thus provides data to stakeholders for planning and control of childhood visual impairment and blindness. The crude prevalence in this study is lower than estimates for Sub-Saharan African[14] but compares to the findings of key informant surveys elsewhere. Duke[12] reported 0.009% to 0.022% in LGAs of Cross Rivers; Muhammad et al [8, 13]0.02% to 0.008% in LGAs of Sokoto; and 0.017% in Kilimanjaro region of Tanzania[3].

The lower prevalence we observed may have been impacted by the absence of known blind children who attend blind schools in the neighboring Plateau state, the improvements attained from the childhood survival campaigns including vitamin A supplementation and measles immunization. For example, with a worldwide increase in measles immunization coverage from 72% to 85%, there has been a significant decrease in measles incidence between 2000 and 2013 [15].

Somekey informant studies on childhood blindness within Sub Saharan Africa reported higher crude prevalence than this study. Kalua et al [4]reported 0.9/1,000 in Malawi (2007); Boye[5]in Ghana reported 0.74/1,000 (2005);and Demissie et al [6]reported 0.62/1,000 in an Ethiopian district (2009). This wide variation may reflect the various stages of socio-economic development and the levels of health care services between the regions where the studies were conducted. The time difference may also have contributed to the variation with a worldwide improvement in healthy public policies and interventions in the latter years.

The commonest cause and the anatomical site of abnormality for severe visual impairment and blindness in this study (lens, cataract) compares to findings in 5 districts of Sokoto state[13](36%) ,Calabar[12](35%), Malawi[4] (35%), Ethiopia[6] (33%) and Bangladesh[7] (33%). This highlights an unmet need for cataract services in children for which the underlying aetiology could not be determined.

Similar to our finding, a study in Bangladesh[7] reported cornea-related diseases (26.6%) as the second leading cause of visual loss in children. Our study compares to report by Shirima et al[13] in Tanzania that corneal scarring was not related to measles or Vitamin A deficiency. Unlike studies[7, 8, 16]linking measles infection and Vitamin A deficiency to corneal scarring, this study suggests most (75%) of the corneal scars were linked to ophthalmia neonatorum from neonatal underlying causes. This may reflect the high immunization and vitamin A supplementation coverage in the region[17]. It however underscores the likelihood need for improvement in antenatal and neonatal care in the study area.

Avoidable factors were responsible for majority of blindness and severe visual impairment in this study that compares to findings in other parts of Nigeria[12,13], Malawi[4] and Bangladesh[7]. This however, contrasts the finding in a district of Sokoto state[8] where all the avoidable causes of blindness were preventable(cornea-related). These varied reports on the causes of blindness and severe visual impairment may reflect a changing pattern in the major causes of childhood blindness from cornea to lens-related causes[18,19].

This study has provided stakeholders with the leading and underlying causes of childhood visual impairment in Nasarawa state and a projected magnitude of children in need of optical, medical, surgical and/or educational rehabilitation services. We therefore recommend that these children should be traced and be provided with these service using a participatory planning approach involving all stakeholders. Although spectacles were prescribed for 12 children (30.8% of 39) and8(20.5%) others referred for cataract surgery, the local authorities should support these families to enable these children access these services.

Conclusion

Avoid able causes were the leading causes of childhood blindness and severe visual impairment with cataract being the commonest cause in the district. The findings indicate that an estimated 415 children need eye care, educational and/or rehabilitation services in Nasarawa state. A participatory approach is required where all stakeholders collaborate to address the avoidable causes through awareness creation, prevention and/or treatment.

References

1. Resnikoff S, Pascolini D, Etya'ale D. Global Data on visual impairment in the year 2002. *Bull World Health Organ*. 2004;**82**:844-51.
2. Gilbert C, Foster A. Childhood Blindness in the Context of vision 2020-The right to sight. *Bull World Health Organ*. 2001;**79**:227-32.
3. Shirima S, Lewallen S, Kabona G. Estimating numbers of blind children for planning services: findings in Kilmanjaro, Tanzania. *Br J Ophthalmol*. 2009; **93**:1560-2.
4. Kalua K, Patel D, Muhit M, Courtright P. Causes of Blindness among children identified through village key informants in Malawi. *Can J Ophthalmol*. 2008;**43**:425-7.
5. Boye J. Validating Key Informant Method in detecting blind children in Ghana. *J Comm Eye Health*. 2005;**18**:131.
6. Demissiea BS, Solomon AW. Magnitude and causes of childhood blindness and severe visual impairment in Sekoru District, Southwest Ethiopia: a survey using the key informant method. *Trans R Soc Trop Med Hyg.* 2011;**105**:507-11.
7. Muhit M, Shah S, Gilbert C. The Key imformant method: A Novel Means of ascertaining blind children in Bangladesh. *Br J Ophthalmol*. 2007; **91**:995-9.
8. Muhammad N, Maishanu NM, Jabo AM, Rabiu MM. Tracing Children with Blindness and Visual Impairment Using the Key Informant Survey in a District of North-Western Nigeria. *Middle East Afr J Ophthalmol*. 2010 Oct-Dec;**17**:330-4.
9. Muhit M. Key Informant Method: Finding children who are blind. *J Comm Eye Health.* 2007; **20**:30-1.
10. Nigeria 2006 Population Census. National Population Commission, Abuja. Nigeria.
11. Gilbert C, Foster A, Negrel AD, Thylefors B. Childhood Blindness: A new form for recording causes of visual loss in children. *Bull World Health Organ*. 1993; **71**:485-9.
12. World Health Organization. WHO/PBL record for children with blindness and low vision: coding instructions and manual for data entry in Epi-info. 2008. 30. Available at https://www.cehjournal.org/wp-content/uploads/who-childhood-blindness/Coding-Instructions-June-23-2008.pdf. Accessed 22 June 2010.
12. Duke R, Otong E, Iso M, Okorie U, Ekwe A, Courtright P, et al. Using key informants to estimate prevalence of severe visual impairment and blindness in children in Cross River State. *Nigeria Journal of American Association for Pediatric Ophthalmology and Strabismus*. 2013; **17**:381-4.
13. Muhammad N, Ali Z. Finding children with blindness and visual impairment in five local government areas of Sokoto state using the key informant method. *Sudanese J Ophthalmol*. 2014; **6**:19-23.
14. Pascolini D, Mariotti SP. Global estimates of visual impairment: 2010. *Br J Ophthalmol British Journal of Ophthalmology*. 2012; **96**:614-8.
15. Subaiya S, Dumolard L, Lydon P. Global routine vaccination coverage, 2014 World Health Organization. *Weekly Epidemiological Record*. Nov 13,2015; **46**:618-28.
16. Chirambo MC, Tielsch JM, West KP. Blindness and Visual Impairment in Southern Malawi. *Bull World Health Organ.* 1986; **64**:567-72.
17. Nasarawa State Government. Strategic Health Development Plan (2010-2015). Nasarawa State Ministry of Health. March 2010. Page 16.
18. Gogate P, Gilbert C. Blindness in children: a worldwide perspective. *J Comm Eye Health*. 2007; **20**:32.
19. Gogate P, Kalua K, Courtright P. Blindness in childhood in developing countries: time for a reassessment? *PLoS medicine*. 2009; **6**.