

## Visually Impaired Children in some sites of Ethiopia: Review on Prevalence, Causes and Problems

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**Abstract:** This paper is a review of literature on the prevalence and causes of visual impairment as well as problems children with visual impairment are facing in Ethiopia. The purpose of the review was to examine the causes of child visual impairment and the problems visually impaired children are experiencing. Thirteen studies which were conducted in Ethiopia between the years 2000 and 2014 on visual impairment of children below the age of 16 were included in the review. The review indicated that while the frequently mentioned causes of complete blindness reported in the studies are cataract and corneal scarring, that of visual impairment (low vision and blindness) are trachoma and refractive error. With little difference, the synthesized data identified corneal scarring as the leading cause to blindness and trachoma to visual impairment (low vision and blindness). The review also indicated visually impaired children live with multifaceted social, psychological and educational problems. Finally, it is concluded that working on enhancement of the prevention practice of trachoma and corneal scarring and solving the problems of visually impaired children need critical attention.

**Keywords:** visual impairment, blindness, prevalence, causes, problems, and children.

### Introduction

Impairment is a phenomenon that might occur at any point of human life. It is a problem in body function or structure such as a significant deviation or loss (World Health Organization (WHO), 2011). All children cannot be born normal. A new born baby may come with one or multiple impairments due to various reasons. Even if a child is born normal with no impairment, he or she may face environmental hazards like accident, burn and physical abuse that might result in impairment of some part of his or her body (Shonkoff & Marshall, 2009; Heward, 2006).

Although there are different types of impairments, this paper focuses on reviewing studies conducted on visual impairment for two reasons: (1) it is not manageable to address all types of impairments in a single study, and (2) an eye is one of the major sense organs through which children explore their world and facilitate their overall development so that its impairment can cause a marked effect on individuals' day to day lives.

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In Ethiopia, different empirical studies have been conducted on causes and prevalence of visual impairment (Aga, 2007; Demissie & Solomon, 2011; Eyob, 2001; Kello & Gilber, 2003; Tibebu & Getu, 2000; Wondu & Samson, 2005; Yemane, Alemayehu, & Abebe, 2006). There are also studies conducted on problems of visually impaired individuals (Ministry of Education (MoE), 2006; Tamiru, 2005; Tirusew, Savlainen, Agedew, & Desta, 1995; Wondu & Samson, 2005). However, no synthesis of the previously done research works is done so far. Synthesizing the previous studies helps researchers to easily identify the research gaps of the area and practitioners to examine the status of the problem to design different intervention programs. Therefore, this review is conducted to address this research gap.

## **Visual Impairment**

Health professionals usually define visual impairments in terms of visual measurement using a vision chart called Snellen chart. Snellen chart has letters of different sizes that are read by one eye at a time from a distance of 20 feet. People with normal vision are able to read the 20 ft line at 20 ft – 20/20 vision (Medical Dictionary, 2016).

Visual impairment is a term that experts use to describe any kind of vision loss (Salvin, 2013). Although there are different classifications of visual impairments, researchers mostly use the general category: low vision and blindness. According to WHO (1992), cited in Tabin & Kelley (2007) low vision is the inability, even with corrective lenses, to clearly see at a distance of 6 meters (20 feet) what individuals with normal vision can clearly see at a distance of 18 meters (60 feet), and blindness is the inability to read the largest letter on a vision chart at a distance of 3 meters (10 feet) (Tabin & Kelley, 2007).

## **Prevalence and Causes of Visual Impairment**

The problem of visual impairment is worldwide. A meta-analysis study conducted by WHO (2010) on visual impairment using selected studies of different countries of the world revealed that the estimated number of visually impaired people in the world was 285 million: 39 million blind and 246 million having low vision. Of these, 18.939 million were children between 0 to 14 years of age from which 1.421 million are blind, and the remaining 17.518 million have low vision. African visually impaired people including Ethiopia constitute 26 million share from which 5.888 million (15%) are blind and 20.407 million (8.5%) have low vision.

Yemane et al. (2006) have also conducted a national blindness and low vision survey in Ethiopia on 25,650 people who were available for examination by the survey team and found that the national prevalence of blindness is 1.6% and that of low vision is 3.7%. On the other hand, Hailie and Destaye (2013) conducted a study on 784 clients whose age is older than 14 years and who came to hospital for eye examination. In the study, it was found that the prevalence of visual impairment and blindness was 15.3% and 14.4 %, respectively. The differences in the result of these studies might have stemmed from the characteristics of the

samples used. That means the former is a general survey conducted on people who were invited by the survey team while the latter is the study conducted on patients who came to hospital for eye examination by their own initiation. In any cases, both studies revealed the prevalence of visual impairment in Ethiopia as of a considerable issue.

### **Causes of Visual Impairment**

Different researchers have identified different leading causes of visual impairment all over the world (Demissie, 2011; Eyob, 2001; Hailie & Destaye, 2013; WHO, 2009, 2010; Wondu & Samson, 2005; Yemane et al., 2006; Yeman et al., 2007). WHO (2009) identified that cataract, uncorrected refractive error, glaucoma, age-related macular degeneration (AMD), corneal opacities, diabetic retinopathy, blinding trachoma and cataract, retinopathy of prematurity and vitamin A deficiency are the leading causes of blindness all over the world. WHO (2010) also reported the principal causes of visual impairment in order of occurrence; i.e., uncorrected refractive errors (43%), un-operated cataracts (33 %), glaucoma (2%) and all other causes like AMD, diabetic retinopathy, trachoma and corneal opacities together (about 1%). A large portion of causes (18%) is undetermined. Similarly, the reported proportion of causes of blindness are cataract (51%), glaucoma (8%), AMD (5%), childhood blindness and corneal opacities (4%), uncorrected refractive errors and trachoma (3%), diabetic retinopathy (1%) and the undetermined causes (21%). The large percentage of the undetermined causes implies that there are still undetected causes of visual impairments.

Similarly, in Ethiopia, the reported causes of visual impairment at national level are macular degeneration, glaucoma, trachomatous corneal opacity, other corneal opacity, refractive error, and cataract (Yemane et al., 2006). By specifying the causes of blindness and low vision, Yeman et al. (2007) reported cataract and trachomatous corneal opacity as the leading causes for blindness and cataract and refractive error for low vision. In a similar way the study conducted by Hailie and Destaye (2013) indicated that blindness is significantly associated with cataract, glaucoma and pseudophakia, and low vision with cataract, refractive error, glaucoma, AMD, pseudophakia. Thus, from these findings, it is possible to identify that the frequently mentioned leading causes of visual impairments in Ethiopia are cataract, refractive error, glaucoma and trachoma.

### **The problem of visually impaired individuals**

The eye and brain work together to form images of things. Since they have limitation on the significant sense organs, visually impaired individuals may face various difficulties to learn about their environment and develop their innate potentials. One of the challenges for these individuals is difficulties of learning school subjects. Both low vision and blind individuals cannot learn without support. The former may need eye glasses or medication and the latter need training to use the remaining senses (touching, hearing, smelling and testing) to collect information to effectively master their lessons (Heward, 2006; Heward & Orlansky, 1988). In

addition to learning difficulties visually impaired individuals may face various social and psychological problems.

## **Method**

This review has been carried out to identify the prevalence and causes of visual impairment, both blindness and low vision, and problems visually impaired children face in their life. Among the thirteen research works reviewed, eight of them are studies conducted in Ethiopia between the year 2000 and 2014 to address prevalence and causes of visual impairment on the basis of the data obtained from different health centers and schools. The samples of the studies were children below 16 years of age and the sample sizes ranged from 36 to 9064. The remaining five studies were related to the problems of visually impaired children in Ethiopia. The first group of studies on prevalence and causes are summarized in two different tables. The first table presented the summarized findings of the articles to identify the frequently mentioned causes and their prevalence. On the other hand, the second table presented the synthesized data of the articles to identify the leading causes and their prevalence. In the latter analysis, one study was excluded because the exact number of children participated in the study was not known. Finally, problems that visually impaired children face are presented in form of thematic descriptions.

## **Result and Discussion**

### **Prevalence and Causes of Visual Impairment in Ethiopia**

As can be observed in Table 1, the most frequently mentioned leading cause of visual impairment (blindness and low vision) for children whose age is below 16 is trachoma (Aga, 2007; Eyob, 2001; Mohammed and Abebe, 2005; Yeman et al., 2006) with exception of Zelalem's (2014) finding that identified trachoma as a fifth cause of visual impairment. From highest to lowest, the reported prevalence rate of trachoma ranges from 40.9% to 10.5% (Eyob, 2001; Yeman et al., 2006; Mohammed and Abebe, 2005; Aga, 2007; Zelalem, 2014). The second frequently mentioned cause is refractive error even though the rank varies from study to study (Mohammed & Abebe, 2005; Tibebe & Getu, 2000; Zelalem, 2014). The prevalence rate of refractive error ranges from 11.8% to 6.3% (Zelalem, 2014; Tibebe & Getu, 2000; Mohammed & Abebe, 2005).

Table 1 also indicates that the leading causes of blindness are corneal scarring (Kello & Gilber, 2003) and cataract (Demissie & Solomon, 2011) followed by corneal opacity, refractive error, glaucoma, phthisis bulbi and Optic hypoplasia (Kello & Gilber, 2003). Refractive error is identified as a cause for both low vision and blindness in this review (Table 1).

Table 1

*Summary of Studies Conducted In Ethiopia on Visual Impairment below Age 16*

Author	Study site	Age group	Sample size	Key finding on causes and prevalence of low vision /blindness	Leading Causes of visual impairment/blindness
Aga (2007)	Enemor & Ener	1-9 years	2,637 (But the sample of children not known)	Follicular trachoma in children aged 1-9 was 33.1%.	Follicular trachoma (visual impairment)
Demissie and Solomon (2011)	Sekoru district Jimma zone	children below age 16	36 children	The causes of blindness/Sever visual impairment were cataract (12 cases, 33.3%), corneal opacity (10 cases, 27.8%), refractive error (6 cases, 16.7%), glaucoma (4 cases, 11.1%), phthisis bulbi (cases 3, 8.3%) and Optic hypoplasia (1 case, 2.8%).	1 <sup>st</sup> Cataract 2 <sup>nd</sup> Corneal opacity 3 <sup>rd</sup> Refractive error, 4 <sup>th</sup> Glaucoma 5 <sup>th</sup> Phthisis bulbi, 6 <sup>th</sup> Optic hypoplasia blind/ SVI
Eyob (2001)	Woreillu	between age 5 &7	420	76.1 % of them (that is approximately 320) were living with problem of eye discharge, itching and excessive tears. Moreover, the examination of both eyes showed that 40.9 % (Approximately 131) of these children have trachoma.	Trachoma (visual impairment)
Kello and Gilber (2003)	A school for the blind near Addis Ababa	Students below age 16	312	62.4% of blindness (Approximately 195) caused by corneal scarring	Corneal scarring (blindness)

Table 1 (contd.)

Author	Study site	Age group	Sample size	Key finding on causes and prevalence of low vision /blindness	Leading Causes of visual impairment/blindness
Mohammed & Abebe (2005)	Goro district	From birth to 15 years	826	Leading causes of ocular morbidity were active trachoma, 278(33.7%), refractive error, 52(6.3%) non-trachomatous conjunctivitis (NTC), 49(5.9%). Refractive error was the leading cause of subnormal and low vision among children aged 6 to 15 years.	1 <sup>st</sup> Active trachoma 2 <sup>nd</sup> Refractive error 3 <sup>rd</sup> non-trachomatous conjunctivitis(NTC) Visual impairment
Tibebu & Getu (2000)	Debark & Koladiba	preschool and school children	1134	7.6% (approximately 86) of low vision caused by refractive error	Refractive error Visual impairment
Yeman et al. (2006)	National survey	1-9 years	9064	40.14% (approximately 3638) of the examined children were found to be victims of trachoma (visual impairment).	Active Trachoma Visual impairment
Zelalem (2014)	Grarbet Hospital: central Ethiopia	Eye 2 months - 15 years	735 children (patients)	The most common ocular morbidity encountered was conjunctivitis (258:35%), then ocular trauma (87:11.8%), refractive error (84:11.4%), Keratitis (77: 10.5%) and Active trachoma (47:6.4%).	1 <sup>st</sup> conjunctivitis 2 <sup>nd</sup> ocular trauma 3 <sup>rd</sup> refractive error 4 <sup>th</sup> Keratitis 5 <sup>th</sup> Active trachoma

Table 2, shows the synthesized data. The data are merged according to the types of visual impairment. The total sample size is the summation of all sample sizes used by studies listed in Table 1. Thus, each total sample size is used as denominator for its respective causes of visual impairment and blindness to calculate the percentage of that particular category. In Table 2, the summation of the percentage of each category may not come 100. This is because some of the authors did not report all the cause of visual impairment in their article.

Table 2

*Synthesized Data for Causes of Visual Impairment and Blindness*

Types	Author	Setting	age	Sample size	Cause	Prevalence	
						n	%
Visual impairment (low vision and blindness)	Eyob (2001)	Woreillu	between age 5 & 7	420	Trachoma	4094	33.6
	Tibebu & Getu, 2000	Debark and Koladiba	Preschool & school children	1134	Refractive error	222	1.82
	Yeman et al. (2006)	National survey	1-9	9064			
	Mohammed and Abebe (2005)	Goro district	From birth to 15 years	826	Non-trachomatous conjunctivitis (NTC)	49	.40
	Zelalem (2014)	Grarbet Eye Hospital: central Ethiopia	2 moths -15 years	735	Conjunctivitis	287	2.37
					Ocular trauma	58	.48
					Keratitis	77	.63
Total sample size: visual impairment (low vision and blindness)				<b>12179</b>			
Blindness	Demissie and Solomon (2011)	Sekoru district Jimma zone	Children below age 16	36	Cataract	12	3.45
					refractive error	6	1.72
					Glaucoma	4	1.15
					phthisis bulbi	3	.86
					Optic hypoplasia	1	.29
	Kello and Gilber (2003)	A school for the blind near to Addis Ababa	Students below 16 years of age	312	Corneal scarring/corneal opacity	205	59
	Total sample size: blindness				<b>348</b>		



When the data collected from different sites are merged together as indicated in Table 2, it is evident that trachoma takes the leading position (33.6%) followed by conjunctivitis and refractive error for the causes of visual impairment. On the other dimension, corneal scarring (59%) identified as the leading causes of blindness followed by cataract, corneal opacity, refractive error glaucoma, phthisis bulbi and optic hypoplasia.

Trachoma, a leading cause of visual impairment in Ethiopia, is one of the preventable and curable diseases. The causative agent of trachoma is *Chlamydia trachomatis*, which is spread by direct contact with dirt and flies (Heward, 2006; Eyob, 2001). It is possible to prevent trachoma by keeping personal, home and environmental hygiene. However, majority of Ethiopian people lack knowledge about how they protect themselves and their children from trachoma. In most places there is lack of water: no proper sanitation system and no proper toilet facility. Personal hygiene seems among the neglected lifestyle tasks in some areas especially in the rural areas. Most children do not wash their faces regularly. In relation to this, Eyob (2001) found that 60.7% of children do not have the habit of face washing or they wash their face less than once a day. Likewise, inspection of the face conducted by ophthalmic nurses of the survey (Yemane *et al.*, 2006) revealed that about 55% of children had either ocular discharge, nasal discharge or fly on their face. This may facilitate the dissemination of trachoma from child to child.

On top to this, the collective lifestyle, characterizing Ethiopian society where many family members live and sleep together, also contributes its parts to the wide dissemination of trachoma by increasing the likelihood of contact of healthy person with infected one. In rural areas, the great majority of people live together with their cattle and other domestic animals. Cattle droppings may play an important role in the transmission of trachoma and other eye infection by furnishing rich breeding sites for flies (Wondu & Samson, 2005).

In addition, lack of health care or eye care service all over the country is another aggravating factor to the dissemination of trachoma as mentioned by different researchers (Eyob, 2001; Negussie 1998).

On the other hand, corneal scarring is found to be the leading cause of child blindness in Ethiopia. Zelalem (2014) has also reported conjunctivitis, ocular trauma and Keratitis as the first, second and the fourth leading causes of visual impairment respectively (Table1.) which all may cause corneal scarring.

A corneal scar may be caused by injury or infection. It is common to observe most of Ethiopian children play in accident prone places. Children play and even fight with stick and stone that may cause eye injury. They also play on dirty places that may cause eye infection. In any case if a child's eyes are injured or infected, the majority of parents, especially the rural people and uneducated ones, prefer to use traditional mechanisms such as *Tsebel* (holy water), *Eminet* (holy soil) and/or other traditional medications (*Yehabesha medianit*) to treat eye infections and injuries (Wondu & Samson, 2005). Most of the time, these people bring

the child with eye disease to health centers after they have checked that the treatment used has failed to cure the disease and after the problem has reached its critical stage. This tradition makes the effort made on early intervention futile and leads the child to loss of vision.

Researchers and health professionals estimated that approximately 80-90 % of blindness in Ethiopia is attributed to preventable or curable diseases (Demissie, 2011; Yemane *et al.*, 2007). As reported in Wondu and Samson's (2005) study, in Ethiopia the cause of corneal scarring is found to be post-measles and/or vitamin A deficiency and the application of harmful traditional eye medication. This implies that corneal scarring is an eye problem that can be prevented through attending childhood vaccinations, taking balanced food with vitamin A content, protecting children from playing in accident prone places and educating people to consult health professionals as soon as the problem occurs and before using any traditional mechanism.

## **Problems of visually impaired children in Ethiopia**

### ***Social problems***

Social problems of visually impaired children involve both the attitude of the family and community. No parent in the world wants to have a blind child. When parents observe a new born blind child, they may be confused, frightened, annoyed, and may blame each other for the child's impairment. In Ethiopia, these psychological tensions are mainly aggravated by negative perception of the society. Disability for the majority of Ethiopian people is perceived as something that comes as a result of sin of parents or grandparents. Tirusew *et al.*, (1995) stated that particularly the rural people believed that disability is a punishment that a person having a disabled child earns from God for his or her bad acts. They also perceive disability as something that results from evil spirit; i.e., when a child is caught by devil ("*buda*" or "*seytan*").

The society also perceives a blind child as a burden to the family, dependent and an object of pity (Tirusew *et al.*, 1995). These perceptions of the community may overwhelm parents and coerce them to keep the impaired child at home. This hinders the child from interacting with the environment at least using the remaining sense organs and hampers his/her cognitive, psychosocial and physical development (Tirusew *et al.*, 1995).

### ***Psychological problems***

The psychological problems of visually impaired children especially the blind ones include dependency and hopelessness. Tamru (2005) stated that by negatively criticizing and showing unnecessary pity, the society not only demoralizes the blind children but also denies them the opportunity to participate in certain socio-economic activities like education and jobs. Such types of societal attitudes about the blind in turn negatively affect the attitudes of the blind

themselves. That means that the blind tend to see themselves as others see them. Therefore, they are forced to accept the inverted public view of their limitations which in turn leads them to develop feeling of hopelessness and high level of dependency.

The success of human beings stems from their motivation to do things. However, when people experience feelings of hopelessness and dependency, they become less motivated and unable to initiate themselves to do their best.

### ***Educational problems***

Access to education is a big problem for visually impaired children, particularly for the blind ones all over the country (MoE, 2006; Tirusew, 1999). Nowadays, MoE is implementing inclusive education to create equal opportunity of learning for all students regardless of poverty, gender, ethnic background, language, learning difficulty, and impairment (MoE, 2006; Kassie, 2013). On the contrary, as it is reported in MoE (2006) ordinary schools tend to refuse to enroll children with special educational needs, particularly those with apparent disabilities like blindness and deafness. This implies that the written educational policy and strategies have not been fully implemented yet.

The implementation of inclusive education requires the provision of the necessary human and material resources for the diverse needs of all students (MoE, 2006). For example, according to Heward (2006), to address the educational needs of visually impaired children, the schools should have specially trained teachers or itinerant teacher consultants and provide different types of special instructional materials and skills. A blind student needs to have access of Braille, Braille's speak, tactile aids and manipulative technological aid for reading; prints such as optacon (optical to tactile converter) and Printed E, computer and orientation, listening training to improve listening skills, and mobility training, electronic travel aids and cane skill. Similarly, a student with low vision needs to access optical devices, large print and classroom adaptation in terms of light and sitting arrangement (Heward, 2006; Heward & Orlansky, 1988; MoE, 2006). Thus, furnishing schools with the required diversified educational resources for all children is a big assignment as well as a problem that needs to be solved for MoE.

### **Conclusions**

In Ethiopia, there is no national blindness prevalence data due to absence of a national surveillance program. The data obtained on the prevalence and causes of visual impairment and blindness mainly depend on hospital data, survey done in some parts of the country, data taken from schools for the blind and national census which is conducted once per 10 years. Although it is difficult to identify the leading cause of childhood visual impairment according to their severity on the basis of such type of fragmented data, this paper identified cataract and corneal scarring are the frequently identified causes for blindness, and trachoma and refractive error are for visual impairment including both blindness and low vision. On the other hand, from the synthesized data, this review has identified that trachoma and corneal

scarring seem to be the leading causes of visual impairment and blindness respectively. It is also found that the development, personal dignity and well-being of Ethiopian visually impaired children seem to be hampered since they are living in an environment with multifaceted social, psychological and educational problems. Thus, working on enhancement of the prevention practice of trachoma and corneal scarring among people and solving the problems of visually impaired children need critical attention.

### **Recommendations**

1. Regular eye checkup is significant to protect the vision of people. Thus, it is better if the Ministry of Health designs early intervention measures by conducting regular eye examination campaigns to be conducted without fees on the side of the child. This encourages low-income parents who are forced to depend on traditional treatment to bring their children to modern treatment and medication.
2. Keeping personal and environmental hygiene is basic to control the dissemination of trachoma. Similarly, improving children's intake of vitamin A and measles immunization, protecting children from infection and injury are crucial to control corneal scarring and corneal opacity. Thus, the Ministry of Health should work in collaboration with religious institutions, local chiefs and school teachers to teach and train people about the prevention mechanisms of trachoma and corneal scarring and make them aware about how the traditional mechanisms of eye treatment aggravate visual impairment.
3. It should be the responsibility of the mass media to frequently inform people about the possible causes of the problem and the importance of taking any child with eye problem to health centers on time so that the child can benefit from early treatment and medication.
4. Although addressing the educational needs of all children for a developing country like Ethiopia is difficult, paying attention to the needs of visually impaired children is very crucial because the impairment of these children is on their major learning sense organ. Thus, MoE should provide basic educational resources that support the visual impaired children to learn using their remaining sense organs.

### **Future Direction**

One of the limitations of this review is that the studies reviewed are fragmented. The articles addressed different topics of visual impairment at different district of the country. Thus, searching compatible research articles in terms of topic and year of investigation across the country is one of the future research directions that research reviewers need to focus on to identify the leading causes and to examine the trend of the prevalence.

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