Original Article

# Ocular Morbidity among Orphans and Vulnerable Children Living in Shelters in Ibadan Metropolis

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## Abstract

**Background:** Globally, orphans and vulnerable children (OVC) represent a significant population at risk of poor health as well as a high risk of developing ocular disorders. These ocular disorders could lead to childhood visual impairment or blindness if left undetected or untreated. This study therefore focuses on ocular morbidity among OVC living in shelter facilities to provide relevant data for planning eye care interventions. **Methods:** A descriptive, cross-sectional study was conducted among OVC ages 5–16 years living within shelter facilities in Ibadan, Oyo State. Sociodemographic characteristics were obtained. Ocular examinations, including visual acuity measurements, colour vision test, Hirschberg test, anterior and posterior segments assessment, and cycloplegic refraction were conducted. Descriptive and inferential analysis was done with IBM SPSS Statistics version 24. All analyses were at 5% level of statistical significance. **Results:** A total of 497 eligible OVC participated in the study. The mean age was 11 ± 3.4 years, and 263 (52.9%) were males. The prevalence of ocular morbidity was 18.1%. The most common types of ocular morbidity were refractive errors 47 (9.5%) and allergic conjunctivitis 18 (3.6%), with more females affected by both conditions, 28 (59%) and 11 (61%), respectively. Ocular morbidity was most common (28.3%) among the 14–16 years age group ($P = 0.001$). **Conclusion:** Refractive errors and allergic conjunctivitis, which are treatable ocular conditions, were the most common ocular morbidities among these children. Regular eye screening as well as the provision of quality and affordable eye care services is advocated for this vulnerable population of children.

**Keywords:** Orphans, Children, Vulnerable Children, Visual Impairment, Africa

## Introduction

Ocular morbidity in children describes a group of eye diseases that could be visual and non-visual impairing.[1,2] The visual impairing ocular morbidities are known to adversely affect the physical and mental development of individuals, with subsequent impact on education and quality of life of affected children.[3]

The burden of childhood blindness is of great concern globally and its control is of high priority for many international health care agencies.[4-6] According to the World Health Organization (WHO), in 2015, the global estimate of childhood blindness was 1.14 million children,[7] and about 75% of those affected live in developing countries.[7,8] The 2015 global estimate of childhood blindness demonstrated a 24% reduction in the number of blind children globally, compared to the 1990 estimate. This is due to effective disease control measures against measles and vitamin A deficiency, leading to a reduction in corneal blindness, which used to be a leading cause of childhood blindness.[7]

Notwithstanding, there is still country-by-country variation in the prevalence of childhood blindness, and this has been related to the socioeconomic status and the under-5 mortality rate of countries.[9] In high-income countries with low under-5 mortality rates, the prevalence is about 0.3 per 1000 children and as high as 1.5 per 1000 children in low-income countries with high under-5 mortality rates.[10]

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Approximately, three-quarters of the world's blind children live in the poorest regions of Africa and Asia, where the prevalence is high.[9,10] Nigeria has an estimated childhood blindness prevalence of 1.5 per 1000 children.[10]

A vulnerable child is one who, due to the circumstances of birth or immediate environment, is deprived of basic needs, care, and protection, and is also prone to abuse. Thus, such a child is disadvantaged relative to his or her peers.[11] Furthermore, a vulnerable child can be one that has been neglected/abandoned, has inadequate access to health, education, and other social support, or lives outside of family care; lives with extended family, in an institution, or on the streets amongst others.[12,13] This state may pose a challenge to their health compared to children living with their parents.[14-17]

It is known that vision plays a vital role in cognitive and motor development of a child as well as in the development of other sensory pathways like the vestibular pathway for balance.[18] Thus, vision invariably plays a key role in a child's learning, physical, mental, and psychosocial development.[18] It can thus be inferred that severe visual impairment in a child, that is not treated or addressed, has the potential to lead to lifelong disabilities with subsequent socioeconomic burden, hence the need for early detection of such problems to prevent irreversible damage and improve quality of life. Considering the peculiarities of these orphans and vulnerable children (OVC); ocular morbidities may be more common and undetected in them, and thus there is a need for studies like this to identify and provide data for care.

Following the WHO's Global Initiative for preventing childhood blindness, school eye screening has been conducted in many school children.[19-23] However, some OVC, who are already disadvantaged, may not be enrolled in schools, and thus may miss out on such screening programs. To the best of our knowledge, there are no established eye screening services for OVC in Nigeria, therefore, this study is timely as it will determine the prevalence of ocular morbidity among OVCs and provide information on the visual needs of children in shelter facilities and areas of priority in planning screening programmes as well as advocacy for this vulnerable group of children.

## Materials and Methods

This was a descriptive, cross-sectional study conducted in September and October 2019 among OVC aged 5–16 years, living within shelter facilities in Ibadan metropolis of Oyo State. The list of shelter facilities within the five urban local governments (Ibadan metropolis) were obtained from the State Ministry of Women Affairs. Simple random sampling was used to recruit 11 out of the 15 shelter facilities in Ibadan metropolis. Each shelter facility had about 50 children and all eligible children who assented to the study were recruited and examined.

Ethical approval was obtained from the Institute for Advanced Medical Research and Training, College of Medicine, University of Ibadan, no UI/EC/18/0228. A letter of approval for the research was obtained from the Oyo State Ministry of Women Affairs, Community Development, Social Welfare and Poverty Alleviation. Also, written informed consent was obtained from the Administrators and Caregivers of each shelter facility and assent from eligible participants.

Included in the study were children aged 5–16 years (for ease of objective visual acuity [VA] assessment and examination), who had lived for 3 months or longer in the shelter facilities. Children with mental disability in whom an objective VA assessment could not be performed were excluded.

A minimum sample size of 450 children, after accounting for clustering with a design effect of two was determined for this study using the Leslie Kish formula[24] for calculating representative sample for single proportions and a previous prevalence of ocular morbidity among children living in orphanages in Nepal (17.9%).[25]

The participants' socio-demographic characteristics, medical and ocular history, were obtained by trained research assistants. For the younger children, this information was obtained from the caregivers. The older children were interviewed directly but responses were sought from the caregivers for questions they could not answer. A history of immunization, measles infection, and vitamin A supplementation in the children was also obtained and confirmed from the caregivers and/or shelter administrators and from each child's record.

A trained research assistant carried out VA assessments, while all other ocular examinations were done by the principal investigator, a fifth-year trainee ophthalmologist. Unaided distance VA of each eye was assessed with a Snellen chart or the Tumbling E-Chart at 6 m in a well-lit environment for some children who were yet to know the alphabets. The last completed line read on the chart was recorded as the presenting distance of VA for each eye. When presenting distance VA was 6/9 or worse, the VA was further assessed with a pinhole or the participant's glasses if the child wore one.

A colour vision assessment was then done using an Ishihara chart in children with VA of 6/60 or better in a well-illuminated room. The test was done according to the instruction manual and recorded accordingly. Successful completion of the Ishihara test was the ability to correctly read 15 plates or more out of 17 plates. The presence of colour vision deficiency in the one eye with the Ishihara test is suggestive of an acquired cause of colour vision deficiency (Ishihara's tests manual for colour deficiency, 38 plate edition; 2011) as congenital colour vision deficiency is usually bilateral. Ocular alignment was checked using the Hirschberg test. A penlight was shone at arm's length, and the corneal light reflection was assessed. For children with abnormal alignment, cover/uncover test was done with a cover paddle to check for the presence of a tropia or phoria.

Anterior segment evaluation was performed with a pen torch. Un-dilated direct ophthalmoscopy was done to assess the posterior segment of children with clear media in a dimly illuminated room, but those with hazy media had dilated direct fundoscopy following the instillation of a drop of 0.5% Tropicamide eye drop.

Refraction was performed with an autorefractor in children with presenting distant VA of 6/9 or worse under cycloplegia (1% cyclopentolate). This was followed by subjective refraction a day after the cycloplegic refraction was done to achieve the best-corrected VA. The effect of the cycloplegic agent on VA was explained to the caregivers and child before instillation.

The remaining children in the shelter facility, aged 2 weeks to 19 years, with their caregivers and shelter administrators who were not part of the study, had free eye screening as part of community service. The caregivers who needed reading glasses received them free, while children with refractive errors were enrolled under the "Seeing is Believing Project" of the Paediatric Unit of the Ophthalmology Department, University College Hospital through which they also obtained spectacles free of charge. Other children with other ocular morbidities that required further care were also referred to the same facility. At the end of the screening exercise for each "shelter facility," health education on ocular hygiene was given to the OVC and their caregivers.

### Data analysis

Data were analysed with the use of IBM SPSS Statistics version 24. Descriptive statistics were done using frequency, proportions, means, and standard deviations to summarize data while the presentation of data was done using tables and charts.

A Chi-square test was used to test for independent variables associated with ocular morbidity. The level of statistical significance was set at $P < 0.05$ for all tests.

## Results

### Sociodemographic characteristics

A total of 497 eligible children participated in this study. There were 263 males (52.9%) and 234 females (47.1%) and the mean age was 11 ± 3.4 years. Four hundred and ninety-four (99.4%) were enrolled in school; 42 (8.4%) were in nursery class, and 3 (0.6%) children had no formal education. Four hundred and twenty-four (85.3%) children were immunized against measles and 260 (52.3%) children had both measles vaccine and vitamin A supplements [Table 1].

**Table 1: Socio-demographic characteristics of study participants**

| Sociodemographic | Frequency ($N$ = 497) | Percentages (%) |
|---|---|---|
| Age | | |
| 5–7 years | 96 | 19.3 |
| 8–10 years | 124 | 24.9 |
| 11–13 years | 132 | 26.6 |
| 14–16 years | 145 | 29.2 |
| Sex | | |
| Male | 263 | 52.9 |
| Female | 234 | 47.1 |
| Level of Education | | |
| No formal education | 3 | 0.6 |
| Nursery | 42 | 8.4 |
| Primary | 227 | 45.7 |
| Secondary | 225 | 45.3 |
| Duration of stay in homes | | |
| <5 years | 319 | 64.2 |
| 6–10 years | 146 | 29.4 |
| >11 years | 32 | 6.4 |

### Presenting ocular complaints of participants

Approximately 55.5% ($n = 276$) of the total children sampled had ocular complaints at the time of the study. The predominant presenting ocular symptoms included eye ache ($n = 93$, 33.70%), followed by itching ($n = 68$, 24.64 %) and watering ($n = 58$, 21.01%). Most of the complaints occurred concurrently with 58.33% ($n = 161$) of these children having two or more complaints: eye ache, watering, itching, redness, and watering. The frequency of the predominant presenting ocular symptom in each child is presented in Table 2.

### Past ocular history

Among all the study participants, 65 (13.1%) had their eyes examined in the past by an ophthalmologist, as was verbally reported by the caregivers of the children. These children were from three "shelter facilities" that had the opportunity of free eye screening being conducted on them in the past by ophthalmologists from nearby facilities. Previous history of use of eyeglasses was reported by 10 (2.0%) of the children while 2 (0.4%) were wearing spectacles at the time of this study. One hundred and fifty (30.2%) children reported previous history of eye complaints. Itching was the most

**Table 2: Predominant presenting ocular symptoms in participants**

| Ocular symptoms | Frequency ($N$) | Percentage (%) |
|---|---|---|
| Eye ache | 93 | 33.7 |
| Itching | 68 | 24.6 |
| Watering | 58 | 21.0 |
| Redness | 27 | 9.8 |
| Difficulty seeing distant objects | 21 | 7.6 |
| Foreign body sensation | 4 | 1.5 |
| Squint | 3 | 1.1 |
| Difficulty walking at night/ in a dark environment | 2 | 0.7 |
| Total | 276 | 100 |

**Table 3: Presenting distant visual acuity of participants by gender**

| Visual acuity | Right eye | | | Left eye | | |
|---|---|---|---|---|---|---|
| | Male | Female | Total *N* (%) | Male | Female | Total *N* (%) |
| 6/5–6/6 | 235 | 201 | 436 (87.7) | 231 | 200 | 431 (86.7) |
| 6/9–6/12 | 23 | 28 | 51 (10.3) | 25 | 29 | 54 (10.9) |
| 6/18–6/24 | 2 | 2 | 4 (0.8) | 5 | 3 | 8 (1.6) |
| 6/36–6/60 | 3 | 1 | 4 (0.8) | - | - | - |
| <3/60 | - | 2 | 2 (0.4) | 2 | 2 | 4 (0.8) |
| Total | 263 | 234 | 497 (100) | 263 | 234 | 497 (100) |

common previous eye complaint and was reported by 48 (32.0%) of the children. This was followed by eye aches reported by 37 (24.7%) children. Lid swelling was reported by 2 (1.3%) of the children.

## Treatment modalities reported for ocular complaints

Sixty (12.1%) children reported that they had some form of treatment modalities to alleviate their eye complaints (both past/present). These were either given to them by their caregivers or sought by the older children themselves. The modalities of treatment reported were instillation of eye drops bought over the counter—33 (63%) children, spectacles prescribed—10 (17%) children, traditional eye medication—10 (17%) children, and yeast tablets—2(3%) children.

## Presenting distant VA of participants

Presenting distant VA of 6/5–6/6 in at least one eye was found among 436 (87.7%) of the children, as shown in Table 3.

Using a presenting VA cut-off of 6/12, 487 (98%) of the respondents had good vision.

**Table 4: Pattern of predominant ocular morbidity among OVCs living within homes**

| Ocular morbidity | Frequency (*N* = 91) | Percentage (%) |
|---|---|---|
| Refractive error* | 47 | 51.7 |
| Allergic conjunctivitis* | 18 | 19.7 |
| Glaucoma suspect | 8 | 8.8 |
| Stye | 4 | 4.4 |
| Macular scar† | 4 | 4.4 |
| Strabismus | 3 | 3.3 |
| Amblyopia | 2 | 2.2 |
| Color vision defect | 2 | 2.2 |
| Cornea scar | 1 | 1.1 |
| Traumatic optic neuropathy | 1 | 1.1 |
| Bilateral pseudophakia‡ | 1 | 1.1 |

*Eight of those with refractive error also had allergic conjunctivitis. †Two of the children with macular scar had strabismus (exotropia) as well. ‡The child with bilateral pseudophakia also had amblyopia. Glaucoma suspect was based on funduscopic finding of cup disc ratio of ≥0.6.

## Prevalence and pattern of ocular morbidities

Ninety-one children had ocular morbidity giving a prevalence of 18.1%. Among these, bilateral morbidities were seen in 81 (89.01%) and unilateral morbidity in 10 (10.99%) children. Table 4 shows the pattern of predominant ocular morbidity among study participants.

## Types of refractive errors

Among the 497 participants, refractive error was found in 47 children giving an overall prevalence of 9.5%. The majority were hyperopic 30 (63.8%) and 13 (27.8%) were astigmatic [Table 5].

## Distribution of respondents' characteristics and ocular morbidity

Female respondents 48 (52.7%) had more ocular morbidities than males 43 (47.3%) with no statistically significant association ($P = 0.231$). Ocular morbidity was significantly most common (28.3%) among the age group 14–16 years ($P = 0.001$). Refractive error was more common among the females 28 (59.6%) and the age group 14–16 years (48.9%), but these differences in proportion by age and gender were not statistically significant [Table 6].

# Discussion

About a third of the children seen in this study were between the age of 14 and 16 years with more male participants, similar to the study by Pant *et al*.[26] among street children in Kathmandu valley, Nepal.

**Table 5: Distribution of types of refractive errors among OVCs**

| Type of error | Frequency (*N*) | Percentage (%) |
|---|---|---|
| Hyperopia | 30 | 63.8 |
| Myopia | 4 | 8.5 |
| Simple myopic astigmatism | 2 | 4.3 |
| Compound myopic astigmatism | 2 | 4.3 |
| Simple hyperopic astigmatism | 2 | 4.3 |
| Compound hyperopic astigmatism | 3 | 6.3 |
| Mixed astigmatism | 4 | 8.5 |

**Table 6: Relationship between demographic characteristics, duration of stay in homes and ocular morbidity of participants**

| | Ocular morbidity | | | |
|---|---|---|---|---|
| | Yes ($N = 91$)*n* (%) | No ($N = 406$)*n* (%) | $x^2$ | *P*-value |
| Sex | | | | |
| Male | 43 (16.4) | 220 (83.6) | 1.435 | 0.231 |
| Female | 48 (20.5) | 186 (79.5) | | |
| Age | | | | |
| 5–7 | 13 (13.5) | 83 (86.5) | 16.167 | **0.001** |
| 8–10 | 13 (10.5) | 111 (89.5) | | |
| 11–13 | 24 (18.2) | 108 (81.8) | | |
| 14–16 | 41 (28.3) | 104 (71.7) | | |
| Duration of stay | | | | |
| < 5 years | 55 (17.3) | 264 (82.7) | 2.308 | 0.315 |
| 6–10 years | 27 (18.5) | 119 (81.5) | | |
| > 11 years | 9 (28.1) | 23 (71.9) | | |
| Vitamin A supplementation | | | | |
| Had vitamin A | 51 (16.8) | 252 (83.2) | 1.134 | 0.287 |
| Did not have vitamin A | 40 (20.6) | 154 (79.4) | | |

The prevalence of ocular morbidity in this study was 18.1% which is comparable to 17.9% reported by Shrestha *et al.*[25] among orphanages in Kathmandu Valley, Nepal. This is likely due to similarities in the population of both studies. On the contrary, studies by Naiya[27] and Pant *et al.*[26] reported that prevalence of ocular morbidity among street children of Kolkata and Kathmandu had higher values of 29% and 31.6%, respectively. Shrestha *et al.*[28] also reported a higher prevalence of 33.7% among children living in squatter settlements. These differences could be attributed to sampling method and sample size studied. Furthermore, it may be because some of these children were on the street where they were likely to be more vulnerable and uncared for compared to the children cared for in shelter facilities with good immunization coverage.

The prevalence of ocular morbidity found in this study is also about the same as those of school-based studies conducted in some parts of Nigeria. Ayanniyi *et al.*[21] reported 19.9% in Ilorin, while 22.6% was reported by Abah *et al.*[20] in Zaria, both in Northern Nigeria. This similarity suggests that the prevalence of ocular morbidity among OVC may not necessarily be different from that of children screened in schools. Therefore, data from school-based studies may also be applicable in planning eye health programmes for OVC living in shelter facilities. However, similar studies among other groups of OVC in shelter facilities in Nigeria are encouraged to provide more evidence for such a conclusion to be made.

Ocular morbidity was significantly more prevalent among children in the age bracket of 14–16 years. This is similar to 11–15 years reported by Shrestha *et al.*[25] among children in orphanages in Nepal and 15–18 years by Pant *et al.*[26] among street children in Nepal. This can be attributed to the occurrence of more refractive errors among the older age group probably because they are better able to articulate their visual needs.

With regards to gender, female respondents in this study had more ocular morbidity than males although, it was not statistically significant. Similar studies by Shrestha *et al.*[25] and Kuman *et al.*[29] reported more ocular morbidity among females as well. This may be attributed to the higher occurrence of refractive errors among girls in this age bracket. Bhardwaj *et al.*[30] who also observed a higher occurrence of refractive errors among girls attributed it to a shorter axial length in females which made hypermetropia more common in them.

Good vision with an acuity of 6/6 or better was observed in a majority (87.7%) of the children. Similar findings were reported by Shrestha *et al.*[28] among 87.9% of OVCs of squatter settlements in Kathmandu and 89.8% by Pant *et al.*[26] Similarly, school-based studies by Ajaiyeoba *et al.*[19] and Abah *et al.*[20] reported good vision in 96.4% and 99% of their study populations, respectively.

The common ocular morbidities observed were refractive errors and allergic conjunctivitis. The overall prevalence of refractive error in this study was found to be 9.5%, which is comparable to 8.6% and 9.0% by Naiya[27] and Shrestha *et al.*[28] OVCs on the streets in Kolkata and Kathmandu, respectively. This may suggest that the prevalence of refractive error in OVCs living in shelter facilities is similar to that seen in street children. Contrary to our findings, a higher prevalence of refractive error (11.6%) was reported by Pant *et al.*[26] and 12.6% by Shrestha *et al.*[25] This may be attributed to the racial differences in frequency of refractive errors among Blacks and Asians.[31,32] A higher proportion of females and children between 14 and 16 years were found in this study to have refractive errors. Apart from the fact that older children are more aware and

expressive of their visual needs, it is also commonly reported that female adolescents have a higher burden of refractive error.[23,33] It is noteworthy that majority of the children with refractive errors in our study were uncorrected and these contribute to the burden of uncorrected refractive errors in our community.

Allergic conjunctivitis was the second most common ocular morbidity in our study. The prevalence of 3.6% found in this study is comparable to the findings of 4.1% by Shrestha *et al*.[28] among children of squatter settlements. However, Naiya[27] reported a higher prevalence of 16.3% for allergic conjunctivitis. The disparity is likely due to the large sample size of 1000 children in the study by Naya[27] and more exposure of the street children to the dusty and polluted environment of the street. Also, the seasonal variation of allergic conjunctivitis should not be overlooked, as our study was conducted during the rainy season although the timing of the other studies could not be ascertained. More females 11 (4.7%) and children between 14 and 16 years of ages had allergic conjunctivitis. A similar relationship between allergic conjunctivitis and females was found by Kuman *et al*.[29] and this could be attributed to the fact that African female school children are exposed to a lot of allergens in the environment than males, as they are mostly involved in chores like sweeping and dusting of furniture.

The prevalence of strabismus was low at 0.6%. A similar finding (0.6%) was reported by Shrestha *et al.*[25] among children in orphanages. This is also comparable to the prevalence of strabismus 0.2–0.3% observed among school children in Nigeria by Ayanniyi *et al*.[21] and Ajaiyeoba *et al*.[19] On the other hand, Shrestha *et al*.[28] in a study among children of squatter settlements and Pant *et al*.[26] in a study among street children reported a slightly higher prevalence of strabismus of 2.4% and 3.0%, respectively. Rao *et al*.[34] furthermore reported a much higher prevalence of strabismus of 4.1% among children less than 17 years of age in Eastern India. The variation in the study by Rao *et al*.[34] may be attributed to the retrospective and hospital-based nature of that study as referral bias is common in hospital-based studies. Notwithstanding, a relatively high prevalence of strabismus is reported among Asians[35,36] in the literature.

Amblyopia was observed in a small (0.4%) proportion of the OVCs, which is similar to the 0.4% reported by Ayanniyi *et al*.[21] in school-based studies. Shrestha *et al*.[25] and Pant *et al*.[26]; however, reported a slightly higher prevalence of 1.1% and 2.5% respectively among children in Nepal. The reasons for these differences are not clear. However, operational definitions of amblyopia may vary and the higher prevalence of refractive errors in their studies may explain the higher prevalence of amblyopia. Notwithstanding, the proportion of amblyopia observed is clinically significant as it is an irreversible condition which can impact education and quality of life of the affected. Hence, the need for an inclusive eye health program cannot be overemphasized.

Glaucoma suspect in this study was 1.6% with a similar prevalence of 1.28% by Sherpa *et al*.[37] among primary school children of Dhulikhel, Nepal, 1.2% by Ayanniyi *et al*.[21] and 2.5% by Ekpenyong *et al*.[23]

The prevalence of congenital color vision defect was similarly low in this study at 0.4%. A similar prevalence for congenital color defect of 0.43% was reported by Sherpa *et al*.[37] However, a slightly higher prevalence for color vision defect of 1.2% was reported by Ayanniyi *et al.*[21] in Nigeria; 2.2% by Shrestha *et al.*[38] in Nepal; and 2.3% by Gupta *et al*.[39] in North India. Although the prevalence of congenital color vision defects varies by race and ethnicity, the higher prevalence documented by these studies could be due to the larger sample sizes of their studies which is required to detect true prevalences for rare conditions like congenital colour vision defects.

Cornea scar was also uncommon in this study, found in 0.2% of the population. Similar findings were reported by Nartey *et al*.,[40] Ekpenyong *et al*.,[23] and Ajaiyeoba *et al*.[19] with a prevalence of 0.1%, 0.2%, and 0.3%, respectively. There was a high record of measles vaccination in this study as seen in 85.3% of the children and this could explain the low prevalence of corneal blindness among these OVCs. A history of night blindness was reported by 0.40%, which was below the WHO cut-off value of >1% recommended for vitamin A supplementation. Also, none of the children in this study was found to have eye signs of vitamin A deficiency; a significant number of the children (61%) had received vitamin A supplementation in the past. This, however, does not rule out the possibility of vitamin A deficiency and other testing may be needed to truly detect this.

## Limitations of the Study

There were some challenges in obtaining accurate information on the children's past ocular history and other past events either because the children could not reliably recall such history, or because their caretakers at the time they experienced the symptoms were no longer working in the shelter facilities. In addition, a dilated fundoscopy with a binocular indirect ophthalmoscope was not done in this study and that is another limitation.

## Conclusion

Refractive error and allergic conjunctivitis were the most common ocular morbidities identified among participants of this study. These morbidities are treatable; however, they have the potential to cause severe visual impairment if untreated. Also, this study demonstrated that the use of over-the-counter eye drops, and traditional eye medications were the common treatment modalities received by OVC.

We recommend periodic comprehensive and ophthalmic assessment of every orphan and vulnerable child at the point of entry into shelter facilities. In addition, shelter facilities, where OVC live, should have sustainable links

to health facilities to enable early detection and prompt treatment of ocular morbidities.

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## Conflicts of interest

There are no conflicts of interest.

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