Original Article

Ocular morbidity among elderly residents of old age homes in East Nepal

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ABSTRACT

Background: With the rapid growth of the aging population in Nepal, the number of older adults residing in old age homes has increased substantially. Elderly individuals living in institutional settings are at higher risk of visual impairment (VI) and blindness compared to their community-dwelling counterparts, largely due to limited access to eye care services and underutilization of available interventions. This study aimed to assess the prevalence of ocular morbidity and to identify the major causes of VI and blindness among elderly residents of old age homes in East Nepal.

Methods: A community-based cross-sectional study was conducted among individuals aged ≥ 60 years living in six old age homes in Koshi Province, Nepal. Distance visual acuity was assessed using an E-optotype Snellen chart at 6 meters, near visual acuity was evaluated using a reduced Snellen chart at 33 cm under standard illumination. Objective refraction was performed using a streak retinoscope, and both uncorrected and best-corrected distance visual acuity (UCDVA and BCDVA) were recorded for the better-seeing eye. Comprehensive ocular examination, including anterior and posterior segment evaluation, was performed using standard clinical techniques. In cases with multiple ocular conditions, the primary cause of VI was determined based on the condition contributing most to vision loss.

Results: A total of 236 elderly residents were enrolled, with a mean (standard deviation) age of 70.5 (9.5) years (range: 60–102). Nearly half of the participants (n = 116, 49.2%) were aged 60–69 years, the majority female (n = 146, 61.9%). Ocular morbidity was detected in 94.7% (n = 447) of eyes. The prevalence of VI and blindness based on presenting visual acuity was 57.4%; this decreased to 39.4% following refractive correction, indicating an 18% absolute reduction. Cataracts (n = 229 eyes, 48.5%) were the leading cause of VI and blindness, followed by refractive error, corneal opacity, retinopathy, and glaucoma. A statistically significant association was observed between age and VI/blindness ($P < 0.05$), whereas no significant association was found with sex ($P > 0.05$).

Conclusions: VI and blindness are highly prevalent among elderly residents in old age homes, with a substantial proportion attributable to avoidable causes. Timely refractive correction, regular comprehensive eye examinations, and increased uptake of cataract surgery could significantly reduce the burden of VI and improve quality of life in this vulnerable population. Strengthening outreach eye care services and integrating routine vision screening into residential care systems are essential to address this largely preventable public health challenge.

KEYWORDS

cross-sectional study, point prevalence, elderly, residential aged care facility, geriatric health service, old age homes, legal blindness, visual impairment, glaucomas, cataracts, federal democratic republic of Nepal

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INTRODUCTION

The global population is ageing at an unprecedented rate. The proportion of individuals older than 60 years is projected to double between 2000 and 2050, increasing from approximately 11% to 22% [1]. According to the 2021 census, Nepal is home to 2.97 million elderly individuals, representing a 38.2% increase compared to the 2011 census [2]. Among this population, approximately 1500 older adults reside in about 82 old age homes across the country [3, 4].

Older adults living in low-income old age homes experience higher rates of visual impairment (VI) and blindness compared to their counterparts in the general population, primarily due to limited access to healthcare services [5]. The prevalence of VI and blindness increases significantly with age, largely driven by conditions such as cataracts, glaucoma, retinal diseases, and age-related macular degeneration [5–8].

These visual conditions not only diminish quality of life but also impose substantial emotional, social, and economic burdens [9, 10]. A large proportion of VI is preventable or treatable through interventions such as refractive correction, provision of spectacles, and cataract surgery [11, 12]. A study conducted in Hyderabad, India reported a prevalence of VI of 30.1% [13], while a study in Nepal's Kathmandu Valley found that the prevalence of ocular morbidity among elderly individuals in old age homes was as high as 96.4% [14]. This highlights substantial variability across populations and underscores the need for population-specific studies. In this context, recent national and global initiatives, including the World Health Organization's World Report on Vision, emphasize the importance of integrating eye care into health systems through prevention, early detection, and accessible services, further reinforcing the urgent need for context-specific evidence to inform equitable and integrated eye care strategies in Nepal [15].

This study aims to identify the causes of ocular morbidity and provide insights to address existing gaps in eye care services. Specifically, it seeks to determine the prevalence of ocular morbidity, assess the prevalence of VI and blindness, and identify their underlying causes among elderly residents of old age homes in Koshi Province, Nepal.

METHODS

A community-based cross-sectional study was conducted from April 2025 to September 2025 in six old age homes in Koshi Province, Nepal (Shree Ram Janaki Shanti Briddhashram, Maya Ghar Samiti, Mangal Radhika Sadan and Pranami Briddhashram, Birateshwor Briddhashram Sewa Samiti, Manav Sewa Ashram, and Mahila Jagriti Tatha Briddhashram) to recruit participants aged ≥ 60 years. The study was conducted in collaboration with the outreach team of Biratnagar Eye Hospital. A memorandum of understanding (MOU) was established between the administrators of the old age homes and the outreach screening team, and appointments were scheduled for eye screening visits. Ethical approval was obtained from the Institutional Review Committee (IRC) of Biratnagar Eye Hospital (Reference no. 116/2025). Written informed consent was obtained from both the administrators of the old age homes and the participating residents.

All ocular examinations were conducted at the respective old age homes on scheduled screening days by a team of optometrists and trained students in the Bachelor of Optometry and Vision Sciences program. Demographic and clinical information was collected using a structured proforma, including age, sex, history of previous eye examination, use of spectacles, history of cataract surgery, and presence of systemic illness. Distance visual acuity was assessed using an E-optotype Snellen chart at 6 meters, near visual acuity was assessed using a reduced Snellen near chart at 33 cm under standard room illumination. Objective refraction was performed using a streak retinoscope (Heine Beta 200, Heine Optotechnik, Herrsching, Germany), and both uncorrected and best-corrected distance visual acuity (UCDVA and BCDVA, respectively) were recorded for the better-seeing eye [14]. VI was classified based on World Health Organization criteria as moderate (VA <6/18–6/60), severe (<6/60–3/60), and blindness (<3/60) in the better-seeing eye [5, 16].

External ocular and anterior segment examination were performed using a portable handheld slit lamp biomicroscope (Keeler PSL Classic Portable Slit Lamp; Keeler Ltd, Windsor, United Kingdom) with adjustable slit illumination for detailed anterior segment evaluation. Posterior segment examination was conducted using direct ophthalmoscopy (Heine BETA 200 ophthalmoscope, Heine Optotechnik, Herrsching, Germany), including assessment of lens status and posterior segment findings. Intraocular pressure was measured using a Schiotz indentation tonometer (Rudolf Riester GmbH, Jungingen, Germany), based on standard indentation tonometry principles [17].

Standard diagnostic criteria were applied to establish ocular diagnoses, and in cases where multiple ocular conditions were present in the same eye the primary cause of VI was determined based on the condition contributing most significantly to vision loss [14]. Participants requiring further detailed evaluation were referred to Biratnagar Eye Hospital, a tertiary-level eye care center in Nepal.

Data were recorded and managed using Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) and subsequently analyzed using IBM SPSS Statistics for Windows (version 20.0; IBM Corp., Armonk, NY, USA). Data were tested for normality of distribution prior to analysis. Continuous variables were summarized as mean (standard deviation [SD], and categorical variables were presented as frequencies and percentages. A Chi-square test or paired *t*-test was used as appropriate. A *P*-value < 0.05 was considered statistically significant.

RESULTS

A total of 236 elderly residents were enrolled in the study, with a mean (SD) age of 70.5 (9.5) years (range: 60–102). Nearly half of the participants (n = 116, 49.2%) were aged 60–69 years, the majority female (n = 146, 61.9%) (Table 1).

Of all participants, 228 (96.6%) were successfully interviewed and assessed, while eight (3.4%) were excluded due to lack of cooperation during history-taking and visual acuity examination. Among those interviewed, 30.7% (n = 70) reported no prior history of eye examination. At the time of assessment, 62.3% (n = 142) of participants were not using spectacles and only 37.7% (n = 86) were (Table 1).

Table 2 presents the distribution of ocular morbidities at the eye level (n = 472 eyes). Each eye was classified according to a single primary diagnosis based on the condition contributing most to VI. Overall, 94.7% (n = 447) of eyes had at least one ocular morbidity.

Visual acuity assessment yielded the following: based on UCDVA in the better-seeing eye, 42.5% (n = 97) of participants had normal vision, 49.6% (n = 113) had moderate VI, 4.0% (n = 9) had severe VI, and 4.0% (n = 9) were classified as blind. Overall, the combined prevalence of VI and blindness was 57.4% under uncorrected conditions. Following refractive correction, the proportion of participants with normal vision increased substantially to 60.5% (n = 138). Correspondingly, moderate VI decreased to 33.3% (n = 76) and severe VI decreased to 2.2% (n = 5), while the prevalence of blindness remained unchanged at 4.0% (n = 9). Hence the overall prevalence of VI and blindness declined to 39.4%. Refractive correction alone resulted in an absolute reduction of 18% in the prevalence of VI and blindness, which was statistically significant ($P < 0.01$). These findings highlight the substantial contribution of uncorrected refractive error to VI in this population (Table 3 and Figure 1).

There was no statistically significant association between sex and VI either before or after refractive correction (both $P > 0.05$). Although a higher proportion of VI was observed among females compared to males under both conditions, this difference did not reach statistical significance (Table 4).

There was a statistically significant association between age group and VI both before and after refractive correction ($P < 0.05$). However, an unexpected downward trend in the prevalence of VI was observed with increasing age, with the highest proportion seen in the 60–69-year age group and the lowest in those aged ≥ 80 years (Table 5). This finding contrasts with established epidemiological patterns and may reflect selection bias, survivor effects, or characteristics specific to the institutionalized study population.

Table 1. Socio-demographic and ocular history of elderly residents

Variable	Value
Age (y), Mean ±SD (Range)	70.5 ± 9.5 (60 to 102)
Sex (Male / Female), n (%)	90 (38.1) / 146 (61.9)
Age group (y), n (%)	
60–69	116 (49.2)
70–79	72 (30.5)
≥80	48 (20.3)
History of eye examination (n = 228) (Yes / No), n (%)	158 (69.3) / 70 (30.7)
Currently wearing spectacles (n = 228) (Yes / No), n (%)	86 (37.7) / 142 (62.3)

Abbreviations: y, year; SD, standard deviation; n, number of participants; %, percentage.

Table 2. Distribution of ocular morbidities at the eye level among elderly residents

Ocular Condition	Number of Eyes (n)	Percentage (%)
Cataract	229	48.5
Refractive Error	100	21.2
Corneal Opacity	22	4.7
Retinopathy*	12	2.5
Glaucoma	12	2.5
ARMD	11	2.3
Retinal Degeneration	10	2.1
Optic Atrophy	8	1.7
Macular Scar	5	1.1
Phthisis Bulbi	3	0.6
Others	35	7.4
Normal Eyes	25	5.3
Total Eyes	**472**	**100.0**

Abbreviations: n, number of eyes; ARMD, age-related macular degeneration. Notes: Analysis is based on eyes (n = 472); Each eye was assigned a single primary diagnosis; In cases with multiple coexisting conditions, the condition contributing most to visual impairment was recorded [14]; * Retinopathy refers to hypertensive or diabetic retinopathy.

Table 3. Distribution of uncorrected and best-corrected distance visual acuity in the better-seeing eye among elderly residents

Visual acuity category (WHO classification)	UCDVA, n (%)	BCDVA, n (%)
Normal (6/6–6/12)	97 (42.5)	138 (60.5)
Moderate VI (6/18–6/60)	113 (49.6)	76 (33.3)
Severe VI (<6/60–3/60)	9 (4.0)	5 (2.2)
Blindness (<3/60–PL)	9 (4.0)	9 (4.0)
No light perception	0 (0.0)	0 (0.0)
Total	**228 (100.0)**	**228 (100)**

Abbreviations: WHO, world health organization; UCDVA, uncorrected distance visual acuity; BCDVA, best-corrected distance visual acuity; VI, visual impairment; PL, perception of light. Note: Classification based on WHO criteria [5, 16].

Table 4. Association of sex with visual impairment and blindness based on uncorrected and best-corrected visual acuity (n = 228)

Sex	UCDVA: VI	UCDVA: NL	*P*-value	BCDVA: VI	BCDVA: NL	*P*-value
Male, n (%)	52 (22.8)	38 (16.6)	0.10	37 (16.2)	53 (23.2)	0.10
Female, n (%)	79 (34.6)	59(25.8)		53 (23.2)	85(37.2)	
Total, n (%)	**131 (57.4)**	**97 (42.4)**		**90 (39.4)**	**138 (60.4)**	

Abbreviations: n, number of participants; %, percentage; UCDVA, uncorrected distance visual acuity; BCDVA, best-corrected distance visual acuity; VI, visual impairment; NL, normal.

Table 5. Association of age group with visual impairment and blindness based on uncorrected and best-corrected visual acuity (n = 228)

Age group	UCDVA: VI	UCDVA: NL	*P*-value	BCDVA: VI	BCDVA: NL	*P*-value
60–69-y, n (%)	51 (22.3)	59 (25.8)	**0.01**	35 (15.3)	75 (32.8)	**0.01**
70–79-y, n (%)	47 (20.6)	23 (10.1)		33 (14.4)	37 (16.2)	
≥80-y, n (%)	33 (14.4)	15 (6.5)		22 (9.6)	26 (11.4)	
Total	**131 (57.4)**	**97 (42.4)**		90 (39.4)	138 (60.4)	

Abbreviations: y, years; n, number of participants; %, percentage; UCDVA, uncorrected distance visual acuity; BCDVA, best-corrected distance visual acuity; VI, visual impairment; NL, normal. Note: *P*-value < 0.05 is shown in bold.

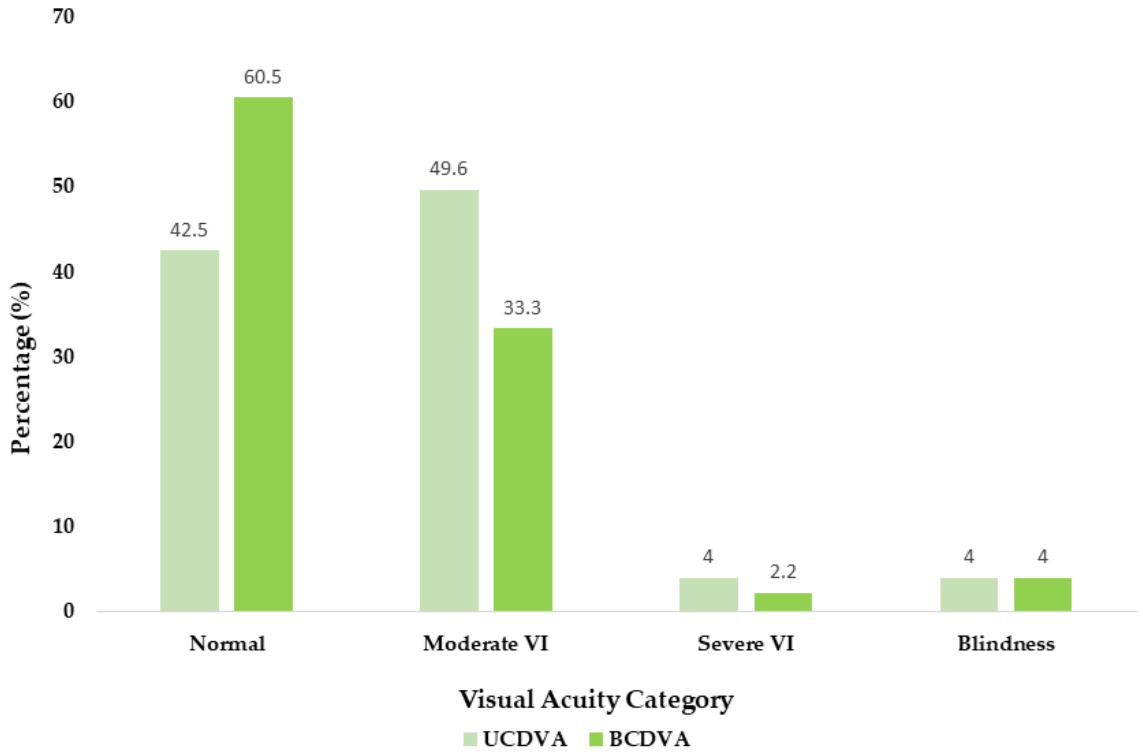

Figure 1. Distribution of visual acuity categories based on uncorrected and best-corrected distance visual acuity in the better-seeing eye (n = 228). Abbreviations: N, number of participants; UCDVA, uncorrected distance visual acuity; BCDVA, best-corrected distance visual acuity; VI, visual impairment. Note: Classification based on World Health Organization criteria [5, 16].

DISSCUSSION

This study revealed a markedly high prevalence of ocular morbidity (94.7%) among elderly residents of old age homes, underscoring a substantial yet largely unmet eye care need in this vulnerable population. A considerable proportion of participants (30.7%) had never undergone an eye examination, reflecting poor awareness and limited access to eye care services. In addition, a majority of residents (62.3%) were not using spectacles despite prior prescription, suggesting significant gaps in utilization of available vision correction. Reported reasons included financial constraints, loss or breakage of spectacles, and misconceptions regarding the benefits of visual rehabilitation in older age. These findings highlight both systemic and behavioral barriers to effective eye care delivery in institutionalized elderly populations.

The majority of our study population were female residents (61.9%), with similar findings reported [9, 18, 19]. The higher number of females is mainly due to some old age homes having only female residents and possibly a lack of housing alternatives, as in addition to being more financially dependent and emotionally vulnerable women may be lacking proper care from their families after their husband's death [20, 21].

The prevalence of VI and blindness in our study decreased from 57.4% before refractive correction to 39.4% after correction. This post-correction prevalence is lower than the 58.4% combined prevalence of VI and blindness reported by Waked et al. [8], yet their estimates were based on visual acuity measured with existing correction only and without standardized refractive assessment, which limits direct comparability between the two studies. A study conducted by Thapa et al. [22] among community-dwelling adults aged ≥ 40 years in Bhaktapur, Nepal reported a VI prevalence of 18.57% that decreased to 4.4% after best refractive correction. This corrected prevalence is considerably lower than that observed in our study; however, this difference may be explained by variations in study populations, as their data were derived from a general community sample whereas our cohort represents a more clinically selected group. Additionally, factors such as limited access to eye care services, lack of regular vision screening, financial constraints affecting spectacle use, and misconceptions that visual decline is a normal part of aging may further contribute to the higher prevalence observed in institutionalized elderly populations. Although direct comparison is limited due to differences in study design, our findings support previous evidence that VI is highly prevalent among nursing home residents [23].

Cataracts were the leading cause of VI and blindness among our participants. This finding broadly supports other work, like that of Waked et al. [8] and Dev et al. [14, 24]. Cataracts remain a leading cause of VI in nursing home residents, likely reflecting the high prevalence of untreated age-related eye diseases and limitations in access to eye care services in this population [25].

Most VI is avoidable, with many causes being preventable or treatable; improved access to refractive services plays a crucial role in reducing vision loss globally [26, 27]. We observed that adequate refractive correction alone reduced the prevalence of VI and blindness by 18%. Similarly, West et al. [28] reported a reduction in VI from 38% to 29.3% following refractive correction among nursing home residents. The relatively smaller reduction in VI and blindness following refractive correction may be attributed to the high prevalence of cataracts (48.5%) in our cohort, as well as the presence of other causes of VI, including corneal opacity, hypertensive or diabetic retinopathy, glaucoma, age-related macular degeneration, retinal degeneration, optic atrophy, macular scar, and phthisis bulbi.

We observed no significant association between sex and prevalence of VI and blindness, suggesting a comparable burden across genders. This is in line with findings by Dev et al. [14], who similarly reported no gender predilection for VI among elderly in residential care facilities. This may reflect similar exposure to age-related ocular conditions and comparable access to eye care services among male and female residents in institutional settings.

We found a statistically significant association between age and prevalence of VI and blindness, confirming age as an important determinant of visual decline. However, contrary to established epidemiological patterns, the prevalence of VI in our study decreased with advancing age, with the highest proportion observed in the 60–69 age group and the lowest among those 80 and older. In contrast, Waked et al. [8], Dev et al. [14], and Elliott et al. [18] consistently report an increasing prevalence of VI and blindness with advancing age among elderly populations in residential care settings. The discrepancy observed in our study may be explained by selection bias, survivor effects, or characteristics specific to the institutionalized population.

This study underscores the critical role of eye care professionals in reducing the burden of VI and blindness, particularly from avoidable causes such as cataracts and uncorrected refractive error. The community-based screening approach adopted in this study represents a key strength, enabling identification of unmet eye care needs among a vulnerable and often underserved population. Still, several limitations should be acknowledged. The cross-sectional design limits causal inference, and the institutionalized study population may not be representative of the broader elderly population, potentially introducing selection bias. Additionally, the observed atypical age-related trend in VI may reflect survivor effects or sample-specific characteristics. Future longitudinal and multicenter studies are warranted to better understand these patterns and to evaluate the long-term impact of targeted eye care interventions in residential care settings.

CONCLUSIONS

The prevalence of VI and blindness among elderly residents in old age homes is substantial, with a large proportion attributable to avoidable causes, particularly cataracts and uncorrected refractive error. These findings highlight significant

gaps in access to eye care services and awareness of the benefits of timely treatment. Regular, comprehensive eye examinations and improved utilization of refractive correction and cataract surgical services have the potential to substantially reduce the burden of VI and enhance quality of life. In this context, the study recommends that tertiary eye hospital outreach teams implement regular vision screening programs in old age homes and that comprehensive eye examinations be conducted prior to residents' admission. Strengthening outreach services, promoting awareness, and integrating routine vision screening into residential care systems are essential to address this largely preventable public health issue.

ETHICAL DECLARATIONS

Ethical approval: Ethical approval was obtained from the Institutional Review Committee (IRC) of Biratnagar Eye Hospital (Reference no. 116/2025). Written informed consent was obtained from both the administrators of the old age homes and the participating residents.

Conflict of interests: None.

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