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Vision-Specific and Psychosocial Impacts of Low Vision on Quality of Life in Northern Uttar Pradesh, India

Namrata Srivastava[1], Sanjana Gupta[2], Vishwadeep Mishra[3]

[1] Associate Professor, Department of Optometry ERA University of Allied Health Science, Lucknow, Uttar Pradesh, India
Corresponding Author Email: *nam.dropth[at]gmail.com*

[2]Department of Optometry T. S. Mishra Lucknow, Uttar Pradesh, India

[3]Department of Optometry School of Sciences, C.SJ.M University, Uttar Pradesh, India

Abstract: ***Background: Low vision, defined by the World Health Organization as best-corrected visual acuity below 6/18 but better than light perception or a visual field under 10°, affects over 2.2 billion people globally, with approximately 62 million individuals in India experiencing visual impairment. While functional limitations are well-documented, the psychosocial consequences in underserved areas like Northern Uttar Pradesh remain understudied, exacerbated by limited healthcare access, poverty, and rural residency. Objective: This study aims to evaluate the vision-specific and psychosocial impacts of low vision on quality of life (QOL) and mental health among individuals in Northern Uttar Pradesh, India, while identifying key sociodemographic predictors influencing these outcomes. Methods: A prospective case-control study was conducted at the Regional Institute of Ophthalmology, Sitapur Eye Hospital, from January 2023 to March 2024.Ninety participants (45 low vision cases and 45 age- and gender-matched controls) were assessed using the National Eye Institute Visual Function Questionnaire25 (NEIVFQ-25) for QOL and the Generalized Anxiety Disorder-7 (GAD7) scale for anxiety. Results: Participants with low vision exhibited significantly lower NEIVFQ-25 scores and higher GAD-7 scores compared to controls ($p < 0.001$). Regression analysis revealed rural residency, low income, and elevated anxiety levels as significant predictors of reduced QOL, accounting for 68% of the variance. Conclusion: Low vision substantially impairs both functional ability and mental health. Region-specific, integrated care models combining visual rehabilitation, mental health services, and stigma reduction are essential for improving patient outcomes in rural India.***

Keywords: Low vision, quality of life, NEIVFQ-25, GAD-7, mental health, Psychosocial impact, rural health, visual impairment.

1. Introduction

Visual impairment, particularly low vision, remains a critical global public health challenge, affecting an estimated 2.2 billion individuals worldwide, with at least 1 billion cases attributable to preventable or treatable causes World Health Organization [WHO].[1] Low vision, as defined by the WHO, refers to a visual acuity of less than 6/18 but equal to or better than perception of light in the better eye, or a visual field restricted to less than 10°, despite optimal medical, surgical, or refractive correction.[1] Unlike total blindness, low vision implies residual visual function that can be harnessed with appropriate assistive devices and rehabilitation strategies to improve quality of life (QOL). However, the global burden of low vision remains substantial, driven by aging populations, rising prevalence of non-communicable diseases, and inequities in access to eye care services.[2]

In India, the burden of visual impairment is particularly pronounced, with an estimated 62 million individuals affected, including approximately 54 million with low vision and 8 million who are blind.[3] The primary causes of low vision in India include preventable conditions such as uncorrected refractive errors and cataracts, which account for a significant proportion of cases, as well as irreversible conditions like glaucoma, diabetic retinopathy, and age-related macular degeneration.[1,4] These conditions are exacerbated by systemic challenges, including limited access to eye care services, particularly in rural areas, and socioeconomic disparities that disproportionately affect marginalized populations.[5,13]In Northern Uttar Pradesh, where healthcare infrastructure is often inadequate, these challenges are particularly acute, contributing to delayed diagnosis and management of visual impairments.

The impacts of low vision extend far beyond visual limitations, profoundly affecting psychological, social, and economic well-being. Research has consistently demonstrated a strong association between visual impairment and mental health challenges, including elevated rates of depression, anxiety, and psychological distress.[6, 7,14]The loss of visual function often leads to reduced independence, social isolation, and diminished participation in daily activities, such as reading, mobility, and social interactions, which collectively erode QOL.[8,15] For instance, individuals with low vision may struggle with tasks requiring near vision (e.g., reading or sewing) or distance vision (e.g., recognizing faces or navigating public spaces), leading to dependency on others and a diminished sense of self-efficacy.[6,16]

Socioeconomic consequences are equally significant, particularly in low- and middle-income countries like India. Visual impairment is associated with reduced employment opportunities, lower household income, and increased healthcare expenditures, perpetuating cycles of poverty.[9] A recent cost-of-illness study estimated that visual impairment and blindness result in an annual economic loss of INR 646 billion in India due to lost productivity and healthcare

costs.[9,17] In rural settings, where access to rehabilitation services such as low vision aids or vocational training is limited, these economic impacts are compounded by social stigma and exclusion, further marginalizing affected individuals.[10]

Despite the growing recognition of low vision's multifaceted impacts, there is a paucity of region-specific data from India, particularly from underserved areas like Northern Uttar Pradesh.[20] This gap is critical, as local sociodemographic factors—such as rural residency, low literacy, and economic constraints—significantly influence the lived experiences of individuals with low vision.[5] This study aims to address this gap by quantifying the vision-specific and psychosocial impacts of low vision using standardized tools: the National Eye Institute Visual Function Questionnaire-25 (NEIVFQ-25) and the Generalized Anxiety Disorder-7 (GAD-7).[18,19] Conducted at the Regional Institute of Ophthalmology, Sitapur Eye Hospital, a tertiary care center in Northern Uttar Pradesh, this research seeks to elucidate the functional limitations, mental health challenges, and sociodemographic factors contributing to the burden of low vision in a resource-limited setting. By providing evidence-based insights, the study aims to inform targeted interventions and policy initiatives to enhance the QOL and well-being of individuals with low vision, fostering greater independence and social inclusion.

Aims and Objectives

This study aims to comprehensively evaluate the vision-specific and psychosocial impacts of low vision on quality of life (QOL) and mental health among individuals in Northern Uttar Pradesh, India, by comparing vision-specific QOL in low vision individuals against controls using the NEIVFQ-25, assessing anxiety prevalence and severity with the GAD-7 scale, and identifying sociodemographic predictors such as rural residency and income that influence reduced QOL and mental health outcomes. Additionally, it seeks to explore the interplay between visual impairment, psychosocial effects, and mental health to inform the development of integrated care models that combine visual rehabilitation and mental health support tailored for rural Indian populations.

2. Methodology

Study Design and Participants

This study utilized a prospective case-control design to investigate the vision-specific and psychosocial effects of low vision on quality of life and mental health. Conducted at the Regional Institute of Ophthalmology, Sitapur Eye Hospital in Northern Uttar Pradesh, the study spanned from January 2023 to March 2024. A total of 90 adult participants were enrolled, comprising 45 cases with low vision and 45 age- and gender-matched controls with normal vision.

Cases were identified through the hospital's low vision clinic, while controls were recruited from the outpatient department (OPD), ensuring they presented with non-vision-threatening conditions such as mild refractive errors or conjunctivitis. The matched design allowed for more accurate intergroup comparisons by reducing confounding variables such as age and gender.[5] The sample size was calculated to detect statistically significant differences in NEIVFQ-25 scores with 80% power and a significance level of $p < 0.05$.[8]

Inclusion and Exclusion Criteria

Participants included adults aged between 18 and 70 years. Cases met the WHO[1] diagnostic criteria for low vision, defined as best-corrected visual acuity less than 6/18 or a visual field of less than 10° in the better eye. Controls had normal visual acuity (≥6/18) with no history of low vision or related impairments.

Exclusion criteria applied to both groups included cognitive impairment, as assessed using the Mini-Mental State Examination (MMSE), [10] diagnosed psychiatric conditions, and lack of consent to participate. These measures ensured the specificity and integrity of the findings regarding the impact of low vision on mental health.[6]

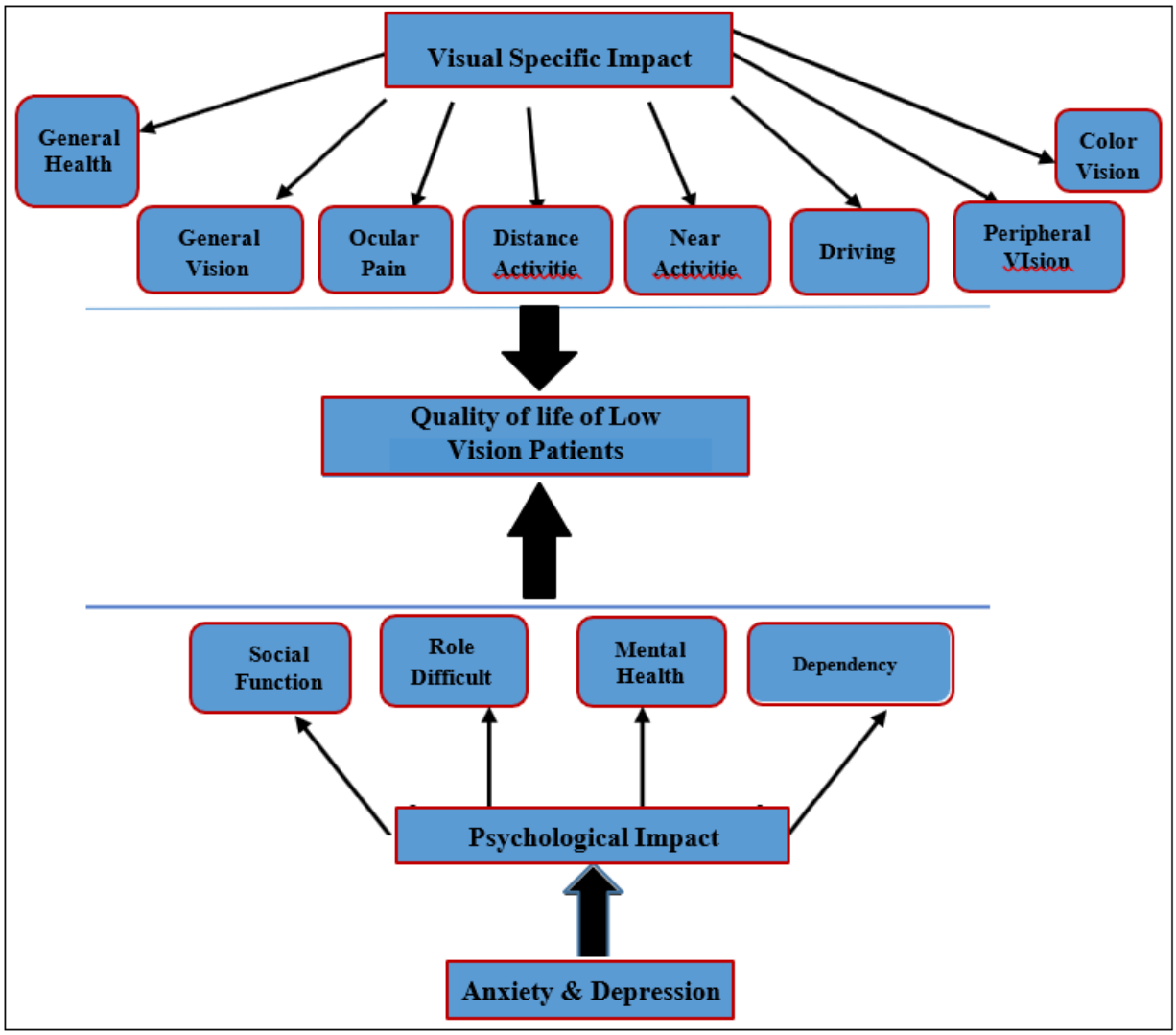

Figure 1: Visual specific and psychosocial aspects

Data Collection Tools

To capture both quantitative and qualitative aspects of vision-related quality of life and psychological well-being, three primary tools were used:

1) **National Eye Institute Visual Function Questionnaire-25 (NEIVFQ-25):** This tool assesses quality of life across 11 vision-related domains, including general vision, near/distance activities, mental health, and social functioning. Scores range from 0 to 100, with lower scores indicating greater functional limitation.[3]
2) **Generalized Anxiety Disorder-7 (GAD-7):** A validated seven-item tool that quantifies anxiety severity. Scores range from 0 to 21, classified as mild (5–9), moderate (10–14), and severe (≥15).[7] It has proven effective in both visually impaired and sighted populations.
3) **Sociodemographic Questionnaire:** A structured questionnaire recorded participants' age, gender, education, income, employment status, family type, and residence (urban/rural).

Interviews were conducted face-to-face in Hindi, the local language, by trained staff. Participants were provided with informed consent forms, and the study received ethical clearance from the Institutional Ethics Committee, adhering to the principles of the Declaration of Helsinki.

Statistical Analysis

Data were processed using Microsoft Excel 2018. Categorical variables (e.g., gender, employment status) were presented as percentages, while continuous variables (e.g., NEIVFQ-25, GAD-7 scores) were described using means and standard deviations. The Mann-Whitney U test was applied for continuous variable comparisons, and chi-square tests were used for categorical data. A p-value < 0.05 was considered statistically significant.

3. Results

Descriptive Statistics

A total of 90 participants were enrolled in the study, including 45 individuals with low vision (cases) and 45 visually normal individuals (controls). The mean age of participants was 52.3 ± 11.4 years in the low vision group and 51.6 ± 12.1 years in the control group, with no statistically significant difference ($p = 0.74$). Gender distribution was identical in both groups, with 60% males and 40% females.

The sociodemographic characteristics showed notable

disparities. Among low vision participants, 66.7% resided in rural areas compared to 46.7% in the control group. Similarly, 48.9% of cases reported a monthly income below INR 10,000 versus 24.4% among controls. Literacy levels were also lower in the low vision group, with only 42.2% having completed secondary education compared to 66.7% of controls.

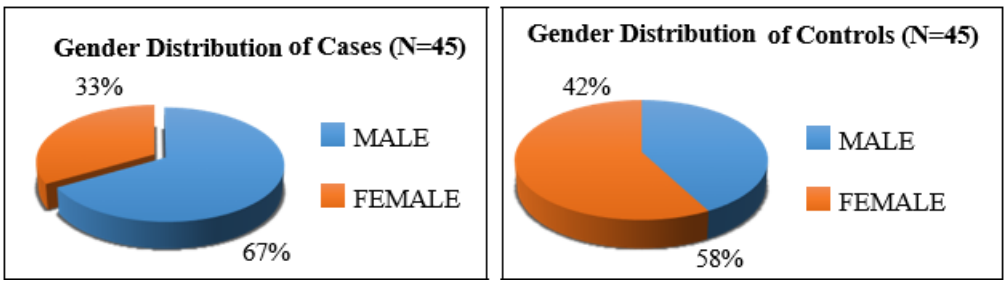

Figure 2: Gender Distribution among Cases and Controls (N = 90)

NEIVFQ-25 Scores

The mean total NEIVFQ-25 score was significantly lower among low vision participants (mean = 54.6 ± 13.7) compared to controls (mean = 89.3 ± 9.5) ($p < 0.001$). Subscale scores also revealed significant differences across all domains. The largest disparities were observed in near activities (mean: 47.8 ± 14.9 vs. 87.1 ± 10.2), mental health (mean: 45.6 ± 13.5 vs. 86.7 ± 12.1), and social functioning (mean: 52.3 ± 15.6 vs. 90.4 ± 11.0). These results highlight substantial functional limitations and psychosocial distress in the low vision group.

GAD-7 Scores

Anxiety symptoms were significantly more prevalent among low vision participants. The mean GAD-7 score was 10.4 ± 4.1 for cases and 4.9 ± 2.8 for controls ($p < 0.001$). According to GAD-7 categorization, 22.2% of low vision participants experienced severe anxiety, 35.6% moderate anxiety, and 31.1% mild anxiety. In contrast, only 4.4% of controls reported moderate anxiety, and none had severe symptoms.

Correlational Analysis

A strong negative correlation was found between NEIVFQ-25 total scores and GAD-7 scores ($r = -0.72$, $p < 0.001$), indicating that lower vision-related quality of life was associated with higher anxiety symptoms. Similarly, lower NEIVFQ-25 subscale scores in mental health and social functioning were strongly associated with higher GAD-7 scores.

Table 1: Demographic profile of studied subjects (*n*=90)

Background characteristics	Cases		Controls	
	No. of patients (*n=45*)	Percentage	No. of patients (n=45)	Percentage
Age (years) distribution				
<30	27	60	21	46.6
30-50	15	33.3	22	49.0
>50	3	6.7	2	4.4
Gender distribution				
Male	30	66.7	19	42.2
Female	15	33.3	26	57.8
Province				
Urban	16	35.6	15	33.3
Rural	29	64.4	30	66.7
Education				
Illiterate	4	8.9	2	4.4
Primary	3	6.7	5	11.2
High School	16	35.6	8	17.8
Intermediate	11	24.4	13	28.8
Diploma	0	0	0	0
Graduation	9	20	11	24.4
Post-graduation	2	4.4	6	13.4
PhD	0	0	0	0
Occupation				
Government employee	1	2.22	4	8.8
Private employee	0	0	3	6.8
Self Employed	11	24.5	8	17.8
Housewife	9	20	15	33.3
Student	15	33.33	15	33.3
Unemployed	9	20	0	0
Family Income (per capita) in rupees	23	51.1	16	35.6
<10000	16	35.6	13	28.8
10000-20000	6	13.3	16	35.6

>20000				
Marital status				
Married	22	48.9	30	66.7
Unmarried	23	51.1	15	33.3
Other	0	0	0	0
Type of family				
Joint family	22	48.9	24	53.3
Nuclear family	23	51.1	21	46.7
Number of family members				
<5	8	17.8	16	35.6
5- 10	29	64.4	25	55.6
>10	8	17.8	4	8.8

Table 2: National Eye Institute Visual Function Questionnaire-25 (NEIVFQ-25) scores of cases (n=45) with controls (n=45)

QOL Subscales	QOL scores for cases		QOL scores for controls		*P*
	Median (SD)	IQR	Median (SD)	IQR	
General health*	51.66 (28.40)	25-75	82.22 (25.90)	75-100	<0.001
General vision*	44.44 (19.02)	20-60	86.66 (15.37)	80-100	<0.001
Ocular pain*	83.05 (22.74)	75-100	78.88 (24.26)	75-100	0.02
Near activities*	34.58 (23.78)	25-50	87.68 (20.27)	75-100	<0.001
Distance activities*	37.59 (28.48)	25-50	96.85 (9.37)	100-100	<0.001
Driving*	8.04 (16.42)	0-10	27.07 (35.83)	0-50	<0.001
Peripheral vision*	48.33 (26.86)	25-75	98.88 (5.21)	100-100	<0.001
Color vision*	52.22 (28.61)	25-75	100 (0)	100-100	<0.001
Social function^	44.72 (27.91)	25-50	99.16 (4.51)	100-100	<0.001
Role difficulty^	27.77 (24.70)	0-50	91.94 (18.29)	100-100	<0.001
Mental health^	27.22 (28.0)	0-50	89.86 (20.58)	93.75-100	<0.001
Dependency^	22.40 (27.36)	0-25	96.85 (12.75)	100-100	<0.001
Composite score	40.66 (18.89)	27.63-49.33	86.33 (19.90)	85.55-97.36	<0.001

QOL = Quality of life; IQR = Inter-quartile range; SD = Standard Deviation * Visual specific sub-scales ^ Psychosocial sub-scales p = significance value

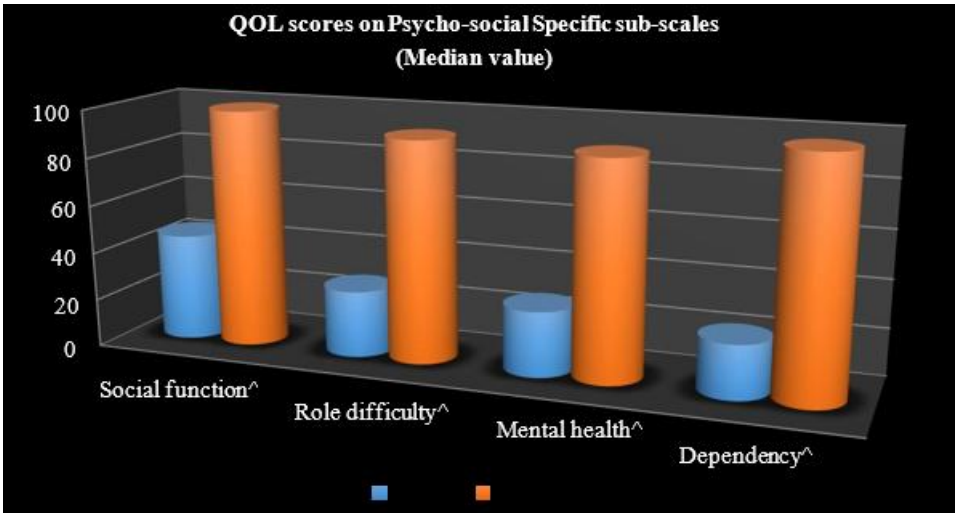

Figure 3

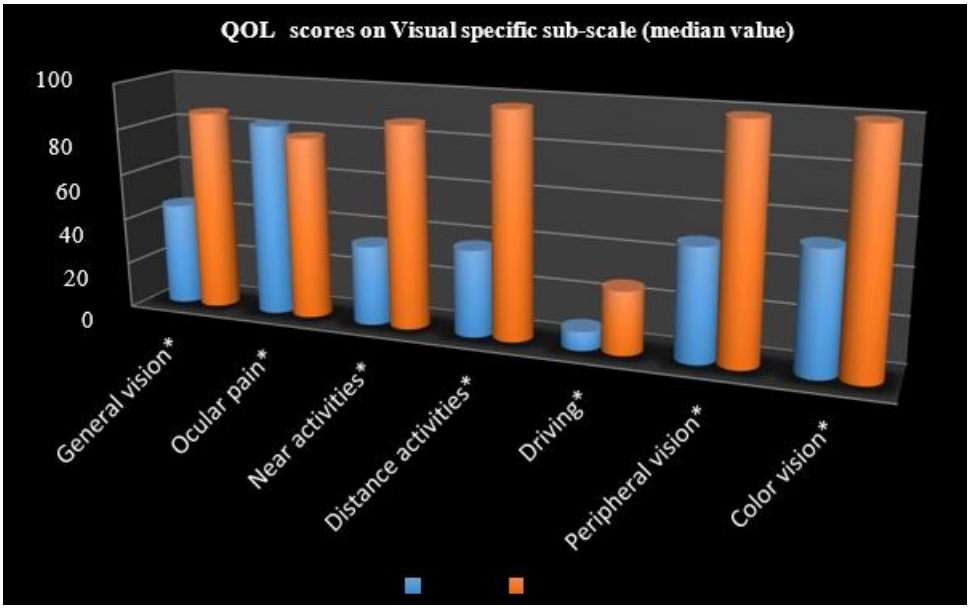

Figure 4

Regression Analysis

Multivariate linear regression analysis identified significant predictors of reduced NEIVFQ-25 scores. Key predictors included low income ($\beta = -5.3$, $p = 0.002$), rural residence ($\beta = -6.1$, $p = 0.001$), and higher GAD-7 scores ($\beta = -4.8$, $p < 0.001$). These factors collectively explained 68% of the variance in NEIVFQ-25 scores ($R^2 = 0.68$).

These findings underscore the complex interplay between visual disability, psychological distress, and socioeconomic disadvantage among individuals with low vision in Northern Uttar Pradesh.

4. Discussion

The findings from this study offer critical insights into the multifaceted impact of low vision on quality of life and mental health in a resource-constrained setting such as Northern Uttar Pradesh. The significant disparities observed between cases and controls across NEIVFQ-25 and GAD-7 scores not only validate existing global literature but also underscore the necessity for localized interventions targeting the unique needs of this population.

The marked reduction in NEIVFQ-25 scores among individuals with low vision aligns with previous studies indicating that visual impairment substantially limits functional independence, especially in tasks requiring near and distance vision.[8] Domains such as near activities, mental health, and social functioning were particularly affected, reflecting the pervasive nature of visual disability on daily living and psychosocial engagement. These findings are congruent with, [6] who highlight that the loss of visual autonomy can lead to profound psychological distress and diminished self-worth.

Similarly, the high prevalence of moderate to severe anxiety among low vision participants, as evidenced by elevated GAD-7 scores, supports the growing body of literature suggesting that visual impairment is a significant risk factor for poor mental health outcomes.[3] The strong inverse correlation between NEIVFQ-25 and GAD-7 scores observed in this study suggests a bidirectional relationship—functional limitations likely exacerbate psychological distress, and conversely, anxiety may further impair subjective perceptions of visual function.

The regression analysis reinforces the compounded impact of social determinants of health. Lower income and rural residency emerged as significant predictors of diminished quality of life, consistent with previous Indian studies.[5, 10] These findings emphasize the intersectionality between economic disadvantage, geographic barriers, and healthcare access, pointing to systemic inequities that need to be addressed through policy and infrastructure development.

Additionally, the influence of mental health on vision-related quality of life cannot be overstated. The inclusion of psychological variables such as anxiety in predictive models enhances our understanding of how emotional well-being mediates the broader experience of visual impairment. Addressing mental health as part of comprehensive low vision care may improve not only patient satisfaction but also functional rehabilitation outcomes.

Taken together, these results advocate for a multi-pronged intervention strategy: (1) expanding access to low vision aids and rehabilitation services in rural areas; (2) integrating mental health screening and counseling into ophthalmologic care; and (3) targeting public health initiatives to raise awareness and reduce stigma surrounding visual disability. The use of culturally sensitive, community-based approaches may be particularly effective in under-resourced settings like Northern Uttar Pradesh.

This study provides region-specific insights into visual disability, emphasizing that effective care for low vision requires more than optical solutions—it must address psychosocial and socioeconomic factors. Future research should focus on longitudinal outcomes and scalability across diverse Indian populations.

5. Conclusion

This study in Northern Uttar Pradesh reveals the profound impact of low vision on quality of life and mental health, evidenced by significant disparities in NEIVFQ-25 and GAD-7 scores between low vision individuals and visually normal controls. Key factors such as low income, rural residency, and elevated anxiety levels exacerbate the functional and psychological burdens, highlighting the critical interplay between socioeconomic challenges and visual impairment. To address these issues, a shift toward holistic, person-centered care is essential, integrating visual rehabilitation, mental health support, and socioeconomic interventions. Tailored programs for rural communities, coupled with efforts to raise awareness and reduce stigma, are vital to closing care gaps. Collaborative action among policymakers, healthcare providers, and community organizations is necessary to foster an inclusive eye care model that enhances both the functional and emotional well-being of individuals with low vision.

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