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Seeing the Unseen: Economic Vulnerabilities and Visually Impairment among older adults in India

Priya Maurya[1] and Rajeev Ranjan Singh[2]

Author's details

1. Priya Maurya
Designation: Postdoctoral Fellow
Affiliation : Institut national d'études démographique, Paris, France
Email id: priyamaurya1326@gmail.com

2. Rajeev Ranjan Singh
Designation: PhD Scholar
Affiliation: Department of Population and Development, International Institute for Population Sciences, Mumbai, India
Email id: rajeevs210@gmail.com

Seeing the Unseen: Economic Vulnerabilities and Visual Impairment among older adults in India

Abstract

The present study examines the relationship between economic well-being and visual impairment (VI) among older adults in India and contributes to the growing body of research on VI and its implications for economic outcomes. The study used first wave of Longitudinal Ageing Study in India (LASI-1), conducted in 2017-2018.The main outcome variable was index of economic well-being (IEWB), and it was assessed using a composite index constructed from index of monthly per capita consumption expenditure (MPCE), index of per capita monthly income (IMPCI) and index of wealth (IW). Severity of VI such as distance, near and any VI was used as the key explanatory variable and other socio-demographic and economic variables were used as control variable. The study finding's shows that the prevalence of moderate VI among older adults with distance, near and any VI was 23.7%, 46.3% and 50.3%, respectively. Around 2.5% of older adults had severe distance VI, and 6.5% of older adults had severe near VI. Overall, the prevalence of severe blindness was 7.6% those having any VI. Further, a consistent decline in economic well-being with increasing VI severity, was observed and those who experienced severe VI or blindness had the lowest scores across all indices, MPCE, MPCI, IW and IEWB. In fully adjusted regression for IEWB, VI was significantly associated with lower composite economic wellbeing scores, with more severe impairment linked to increasing negative impacts. For instance, those with moderate VI (Coeff: -1.793; $p<0.001$, CI: -2.18, -1.41) and severe VI (Coef: -2.305; $p<0.001$, CI: -2.83, -1.78) were negatively associated with having better composite economic wellbeing scores compared to those with VI. Age also had a marked effect on economic well-being. The insight gained from the current research highlights the enhanced accessibility of quality education and improving disability support programmes to nurture economic resilience among visually impaired older people. Addressing VI through enhanced public awareness of preventive care, early diagnosis, improved access to treatment, and the adoption of new medical technologies could greatly improve the quality of life for those affected and their families.

Keywords: Economic wellbeing, India, Older adults, Visual impairment

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Introduction

Visual impairment (VI) is a rapidly escalating global public health issue, particularly among the ageing population. Globally, over 2.2 billion people live with some form of VI and the prevalence of VI is expected to more than double over the next 30 years (Bourne et al., 2021; Flaxman et al., 2017; Abou-Hanna et al., 2021). In 2020, approximately 43.3 million people were blind, 295 million had moderate to severe VI, and 258 million had mild VI (Bourne et al., 2021). Over two-thirds of VI and blindness cases can be averted through prevention or treatment (WHO, 2019). Despite this preventively, millions of people are living with VI due to disparity in access to eyecare services. Consequently, the economic burden of VI is profound, manifesting at both macro and micro levels, it affects individuals, families, and national economies through loss of income, reduced productivity, and increasing poverty risk (Frick & Foster, 2003; Eckert et al., 2015).

VI is a medical condition that causes functional limitation of the eyes, making it more challenging to perform daily tasks (Pascolini & Mariotti, 2012). Individuals with VI, like distance vision loss, near vision loss, and blindness, often face decreased ability to engage in income-generating activities, greater risk of poverty and financial strain (Langelaan et al., 2007; Alma et al., 2012; Harrabi et al., 2014; Eckert et al., 2015). Individuals with VI are significantly less likely to participate in the workforce, and when employed, they often earn substantially less than those with normal vision (Frick & Foster, 2003; Ramke et al., 2018). For instance, studies from sub-Saharan Africa and Southeast Asia have shown that VI reduces household income by 20–30%, and increases the likelihood of falling below the poverty line (Palmer et al., 2014; Kuper et al., 2010). At the household level, VI not only withhold or reduces the earning capacity of individuals with VI, but also imposes indirect costs through increased caregiving demands. This often forces family members, particularly women and children, to withdraw from education or paid employment (Smith et al., 2009; Rius et al., 2018). The relationship between economic well-being and VI is multifaceted and influenced by multiple factors, including educational attainment, employment opportunities and social support. Social inequalities and discrimination also exacerbate economic insecurities, particularly in those countries where social policies related to disability are lacking. Employment opportunities, savings, financial independence and standard of living are directly associated with VI (Brüggen et al., 2017). The impact of VI is not limited to direct income loss.

It extends to reduced productivity, both in the formal and informal sectors. In low and middle-income countries, where a large proportion of economic activity is outside the formal labour market, the loss of productivity due to VI is often underreported but substantial (Eckert et al., 2015; Naidoo et al., 2019).

India, home to the world's largest population, faces a particularly acute burden of VI among older adults. A recent study from India using nationally representative data shows that around 36% of individuals aged 45 and above have some level of low vision and blindness (Singh & Maurya, 2022). The major causes of VI are cataracts and uncorrected refractive error (Vashist et al., 2022). The economic costs of VI in India are staggering. In 2019, the total cost of moderate and severe VI and blindness was estimated at INR 1,158 billion ($54.4 billion at purchasing power parity), accounting for 0.47% to 0.70% of the national GDP (Wong et al., 2022; Mannava et al., 2022). The largest component of this cost is loss of employment, followed by caregiver costs and reduced productivity in employment (Wong et al., 2022). The cumulative loss of gross national income due to blindness alone is estimated at INR 845 billion, with avoidable blindness accounting for more than half of this loss (Mannava et al., 2022). While the economic effects of VI are felt in many low-resource countries, India faces added difficulties because of its large rural population and limited social safety nets (Wong et al., 2022; Mannava et al., 2022). A growing body of research discussed the medical, psychological and social implications of vision loss in India (Bourne et al., 2017; Marmamula et al., 2021), but its impact on economic or financial well-being remains unexplored. In recent times, the health benefits of an individual appear to be strongly associated with their income and quality of life. A segment of the population with VI is particularly affected by the economic disparity in health issues (Marmot & Wilkinson, 2005).

Further, measuring economic well-being through a composite index that integrates income, wealth, and consumption is essential for capturing financial security's complex and multidimensional nature, especially among older adults in India. Other national surveys, such as the National Sample Survey (NSS) and the National Family Health Survey (NFHS), tend to focus on single dimensions of economic status. NSS emphasises consumption expenditure, while NFHS uses a wealth index based on household assets. However, these each approach have limitations such as, income alone reflects only current earnings and may not account for savings, debts, or future financial resilience; consumption measures day-to-day living standards but can overlook non-monetary resources like family support or pensions; and wealth indicates long-term security but may not reflect immediate liquidity needs. Recognising these

gaps, the Longitudinal Ageing Study in India (LASI) adopts a composite approach, combining all three dimensions to provide a more holistic and accurate picture of economic vulnerability among older adults. This methodology is particularly important given the unique economic challenges faced by older adults in India, who often experience irregular income due to retirement or informal work, asset depletion from healthcare or caregiving expenses, and sudden consumption shocks from medical emergencies. The composite index also accounts for rural-urban disparities, as rural households frequently depend on agricultural wealth. In contrast, urban households rely more on salaried income, reflecting the coping mechanisms of older adults facing limited pensions or social protection. Ultimately, this comprehensive measure enables policymakers to design targeted interventions and social safety nets that address the breadth of economic vulnerability in India's rapidly ageing society. Therefore, this study examines the relationship between economic well-being and VI among older adults in India and contributes to the growing body of research on VI and its implications for economic outcomes by addressing this issue.

Data and Methods

Data

This study utilized the data from the first wave of LASI which was conducted in 2017-2018. The LASI survey was a joint collaboration of the International Institute for Population Sciences (IIPS), Mumbai, India, Harvard T. H. Chan School of Public Health (HSPH) and the University of Southern California (USC). It is a nationally representative longitudinal survey of ageing and health that covers the social and economic aspects of the population aged 45 and above. The multistage stratified area probability cluster sampling technique was applied to select the sample. Within each state, a three-stage sampling design in rural areas and a four-stage sampling design in urban areas were adopted. LASI covered a panel sample of 73,396 older adults aged 45 and above and their spouses, including 43,584 households and 31,902 older adults aged 60 and above from 36 states and union territories of India. The details of sampling are provided in the LASI wave-1 report (IIPS, NPHCE, MoHFW, 2020). The total sample included in the study was 57,671 (respondents aged 45 years and above) after dropping the missing values.

Outcome variable

The main outcome variable was economic well-being, and economic well-being was assessed using a composite index constructed from monthly per capita consumption expenditure, per

capita monthly income and household wealth. An index of monthly per capita consumption expenditure, an index of monthly per capita income and an index of wealth were computed.

Construction of index of consumption, index of income, and wealth index: To construct this index, a minimum value of ₹100 was set for both per capita consumption and income. The upper limits for these variables were capped at the 99th percentile, with per capita consumption and income truncated at ₹14,179 and ₹31,562, respectively. Due to the skewed distribution of these variables, we applied a logarithmic transformation to both consumption and income. For the wealth index, we adjusted the composite score to start at 0 by adding a constant of 5.99, resulting in a range from −5.99 to 8.61. All three components—consumption, income, and wealth—were normalised using standard methods.

i. ***Index of monthly per capita consumption expenditure (IMPCE):*** The index was computed as follows:

$$\boldsymbol{IMPCE} = \frac{\ln(MPCEi) - \ln(100)}{\ln(14179) - \ln(100)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where MPCE*i* is the monthly per capita expenditure of the *i*th individual, and ₹100 and ₹14,179 are, respectively, the minimum and maximum monthly expenditures of an individual.

ii. ***Index of monthly per capita income (IMPCI):*** The index was computed as follows:

$$\boldsymbol{IMPCI} = \frac{\ln(PCIi) - \ln(100)}{\ln 31562 - \ln(100)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

iii. ***Index of wealth (IW):*** Principal component analysis (PCA), based on a range of household variables, including consumer durables, home ownership, and household amenities, was used to construct wealth index (Filmer & Pritchett 2001; Rutstein & Johnson, 2004; Rutstein, 2015). The index was computed as follows:

$$\boldsymbol{IW} = \frac{\ln(Compositescore\ i) - 0}{14.59\ - 0} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

iv. **Index of economic well-being (IEWB):** This index was computed using the arithmetic mean of the consumption, income, and wealth indices.

$$\boldsymbol{IEWB} = \frac{1}{3}\,(IPMCE + IMPCI + IW) * 100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

The composite index varies in the range of 0 and 100. The closer the value to 100, the better the economic well-being, whereas the closer the value to 0, the worse the economic well-being.

Key explanatory variable

Severity of VI was used as the key explanatory variable. Severity of VI was sought from LASI's individual-level data. Health investigators assessed presenting visual acuity (PVA), which was field tested by the LASI team to ensure its reliability and comparability with the standard log MAR chart method. The Tumbling E log MAR chart was utilised for distance vision, with the participant standing 3 meters away. The first screen corresponded to 20/125, 20/100, 20/80, or 20/63 acuity levels, adapted based on the participant's responses. If the respondent correctly identified 3 out of 5 letters, the computer would adjust to display smaller or larger letters accordingly. The near vision test followed a similar process, with participants positioned 40 cm from the screen. Both tests were conducted with precautions to minimise glare. Then VI was categorized according to WHO definitions, VI severity based on best correction available on both eyes: no VI (≥20/40), mild VI (<20/40–20/60), moderate VI (<20/60–20/200), and severe VI or blindness (>20/200).

Other covariates

Individual and household-level characteristics of the study population were considered as covariates. Based on previous literature, these variables had an effect on economic well-being and VI. Age was divided into four groups: 45-54 years, 55-64 years, 65-74 years and 75 and older. Sex was categorised as female or male. Educational attainment was categorised as no education, less than 5 years, 5-9 years completed, and 10 years and more. Marital status was coded as currently married, widowed and other (which included never married, divorced, separated, deserted and live-in relationships). Self-rated health (SRH) was recoded into two categories, namely, poor (very poor and poor) and good (fair, good and very good). Chronic condition was assessed through self-reported nine chronic conditions (hypertension, diabetes, cancer, lung disease, heart disease, stroke, bone-related disease, neurological/psychiatric diseases, and high cholesterol). Those who did not have any condition were considered as no, those who had one condition were coded as having 1 chronic condition, and those who had 2 or more chronic diseases were coded as two or more. Smoking, tobacco use and health insurance variables were coded as no and yes.

Living arrangement was recoded as living alone, living with spouse and/or others, living with spouse and children and living with children and/or others. Individuals living below the poverty line (BPL) were sought from the household level data and coded as no and yes. The subjective financial well-being of households was assessed through LASI's household-level data.

Respondents were asked, "How well would you say your household is managing financially these days?" The response was coded into five categories: 'living comfortably', 'doing all right', 'Just about getting by (have to be careful, but getting by)', 'finding it difficult' and 'finding it very difficult'. Caste was categorised as Scheduled Tribe (ST), Scheduled Caste (SC), Other Backwards Class (OBC) and others (including other than OBC/SC/ST). Religion was coded as Hindu, Muslim, Christian and others (including Buddhism, Jainism and others). The place of residence was coded as urban and rural.

Statistical Analysis

Descriptive statistics and bivariate analysis were conducted to understand the characteristics of the study population. Further, ordinary least squares (OLS) regression was applied to understand the association between the severity of VI and different parameters of economic well-being. Four models of regression were built, and the models considered IMPCE, IPCI, WI and IEWB as outcome variables, respectively. Taking MPCE as an outcome variable, the equation for the OLS regression model can be expressed as:

$$Y_i = \alpha + \beta X_i + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

All the models were controls with other background characteristics included in the study and results were presented as adjusted coefficients (Coef) with a 95% confidence interval (CI). Full model result was presented for IEWB. All the statistical analysis was done using STATA-17.1 software.

Results

Table 1 represents the characteristics of the study population. More than one-third of the respondents (35.7%) were from the 45-54 years age group, while only 10% of respondents were aged 75 or older. Females made up 54% of the study population, higher than males (46%). Around half of the respondents did not have formal schooling, and only 18% had completed at least 10 years of education. The majority of older adults were currently married (74.4%), and 23% were widowed. On considering health, about 82% of respondents rated their health as good, 28% reported having at least one chronic health condition, 17% were smoking, and 23% of them were using tobacco. About one in five respondents (20.51%) had health insurance. On considering household characteristics, more than half of older adults were residing with a spouse and children, while 3.7% were residing alone. In terms of caste, nearly half of the respondents (45.5%) belonged to the OBC caste and predominantly belonged to the Hindu (82.46%) religion, with smaller proportions identified as Muslim (11.09%) followed by Christian (2.96%). Most of the older adults were from rural areas.

Figure 1 shows the severity of VI among older adults with distance, near and any VI in India. The prevalence of moderate VI among older adults with distance, near and any VI was 23.7%, 46.3% and 50.3%, respectively. Around 2.5% of older adults had severe distance VI, and 6.5% of older adults had severe near VI. Overall, the prevalence of severe blindness was 7.6% those having any VI.

Table 2a represents the severity of distance VI by background characteristics, and findings showed that distance vision loss among older adults in India was affected by age, education, health, living conditions and economic status. Distance VI increased with age; for instance, 65.9% of people aged 45-54 reported no VI, whereas the percentage dropped to 14.8% among those aged 75 and older. Male older adults experienced better distance vision outcomes than females. However, blindness prevalence was slightly higher among males than among their counterparts. Married individuals tend to experience less distance VI compared to widowed older adults. Higher education level and subjective economic well-being were associated with lower distance VI. For instance, those with over 10 years of education and living comfortably had the lowest level of severe VI. Health also played a critical role for VI as those with good self-rated health and no chronic condition had a lower prevalence of distance vision loss while smoking, tobacco use, and multiple comorbidities were linked to greater distance VI. Urban residents had slightly better vision health than rural dwellers.

Table 2b represents the severity of near VI by background characteristics, and findings highlighted that near vision loss among older adults in India is exacerbated by increasing age, low educational attainment, poor health and lower subjective economic status. Younger adults (45-54 years) had the lowest prevalence (2.86%) of severe near VI, which sharply increased to 18.93% among older adults aged 75+. About 13% of men reported no near VI, and the same prevalence for women was 7%; however, severe near VI prevalence was similar (around 7%) among males and females. Older adults with more than 10 years of education, who were married and living comfortably, had the lowest prevalence of severe near VI. Older adults with good self-rated health, no chronic condition and having health insurance had better near vision outcomes than their counterparts. In contrast, smokers, tobacco users, and individuals with multiple health conditions experienced higher near VI levels. The prevalence of severe near VI was lower among urban residents than rural residents.

Table 2c represents the severity of any VI by background characteristics, and results indicated that better socioeconomic and health conditions were associated with reducing any VI among

older adults in India. Older adults in the age group 45-54 years had the lowest prevalence (3.06%) of severe VI, which sharply increased to 20.76% among older adults aged 75+. One in ten male older adults reported no near VI, and the same prevalence for females was 7%; however, severe near VI prevalence was similar among men and women. Individuals with more than 10 years of education, married, having good health, living with spouse and children, and economically living comfortably reported a lower prevalence of severe VI than their counterparts. Widowed older adults and those who found their financial wellbeing very difficult had about 12% of any VI.

Table 3 shows the prevalence of severity of visual impairment by the index of MPCE, the index of MPCI, the index of wealth, and the combined economic wellbeing index with 95% CI among older adults in India, 2017-2018. The findings indicated a consistent decline in economic well-being with increasing VI severity, and those who experienced severe VI or blindness had the lowest scores across all indices, MPCE, MPCI, IW and IEWB. Individuals with no VI had the highest economic well-being, while those with mild and moderate VI showed a gradual decline, and those with severe VI or blindness experienced the highest economic disadvantage. The IMPCE dropped from 40.18 (no VI) to 36.85 (severe VI/blindness) for any VI, while the IMPCI declined from 72.75 (no VI) to 63.11 (severe VI/blindness) for the same category. Similarly, the IW decreased from 46.2 to 37.93, and the IEWB declined from 52.95 to 45.91 for any VI, reinforcing the economic vulnerability of the severely visually impaired. Further, it can be observed that distance VI appeared to have a stronger negative impact than near VI, with individuals in the severe VI/blindness category were having slightly better economic well-being scores for near VI (46.23) compared to distance VI (44.71), possibly due to greater mobility restrictions and employment limitations in distance VI cases.

Estimated adjusted coefficients for index of MPCE, index of MPCI, index of wealth and combined EWB are presented in **Figure 2** and **Table 4**. Older adults with VI experienced lower MPCE, MPCI and WI than those with no VI across all groups. The negative coefficient can be observed among those having severe VI or blindness for MPCE (Coef: -1.49, $p<0.001$; CI: -1.87, -1.1) and MPCI (Coef: -4.15, $p<0.001$; CI: -5.13, -3.17) (**Figure 2**). In fully adjusted regression for IEWB, VI was significantly associated with lower composite economic wellbeing scores, with more severe impairment linked to increasing negative impacts. For instance, those with moderate VI (Coeff: -1.793; $p<0.001$, CI: -2.18, -1.41) and severe VI (Coef: -2.305; $p<0.001$, CI: -2.83, -1.78) were negatively associated with having better

composite economic wellbeing scores compared to those with VI. Age also had a marked effect on economic well-being. Older age groups, particularly 65-74 years, showed lower index scores than those in the 45-54 years age group. Male older adults were significantly negatively associated with having a better economic well-being score (Coef: -0.38; p<0.001, CI: -0.64, -0.12) compared to females. Higher education had a strong association with better economic well-being. Having more than 10 years or more education provided the greatest economic benefits (Coef: 8.82; p<0.001, CI: 8.47, 9.16), followed by 5-9 years of education (Coef: 3.49; p<0.001, CI: 3.20, 3.77) and less than 5 years of education (Coef: 1.95; p<0.001, CI: 1.61, 2.30). Individuals with good health reported better economic wellbeing (Coef: 0.37; p<0.01, CI: 0.09, 0.66) compared to those with poor health. Interestingly, older adults with one (Coef: 1.45; p<0.001, CI: 1.21, 1.69) and two or more (Coef: 1.99; p<0.001, CI: 1.70, 2.29) comorbidities were positively associated with having better economic wellbeing. Smoking, tobacco use and having BPL cards were significantly associated with lower economic wellbeing compared to their counterparts. Living with spouse and children was associated with increased economic wellbeing (Coef: 2.17; p<0.001, CI: 1.02, 3.32), however, living with children and others was associated with worse economic wellbeing (Coef: -1.98; p<0.001, CI: -2.57, -1.40) compared to those living alone. Economic well-being improved with financial wellness. Rural residents experienced higher economic well-being (Coef: 3.83; p<0.001, CI: 3.58, 4.07) compared to their urban counterparts (**Table 4**).

Discussion

The present study explores the relationship between economic well-being and VI using large scale data from India and findings highlight that severity of VI increases with age, with nearly a quarter of older adults affected by moderate VI and a significant proportion of older adult were facing severe blindness. This high prevalence was closely linked to lower economic well-being, measured by a composite index of consumption, income, and wealth. Those with moderate to severe VI consistently report lower scores, underscoring how vision loss undermines financial stability. VI restricts older adults' ability to engage in income-generating activities, particularly common informal-sector jobs like farming, manual labour, and small businesses, leading to reduced income and consumption. It also raises healthcare costs and caregiving needs, further straining household resources. The prevalence of severe VI has increased with increasing age as many individuals aged 75+ years reported blindness, while very few in age-group 45-54 years affected. Age-related conditions like cataracts and glaucoma contribute to cumulative vision loss, limiting work capacity, increasing the chances of early

retirement, and dependence on family support. The study also found that low education and poor health are linked to higher VI and lower economic well-being. Further, rural residents faced a disproportionate burden of both VI and economic hardship and this is attributed to weaker access to eye care, fewer medical services, and a dependency on vision-intensive jobs like agriculture. This situation worsens with limited social protection in rural areas, which further deteriorates with the VI. The evidence highlights the economic vulnerabilities of older adults with VI, therefore, addressing the economic vulnerabilities of older adults with VI is one significant aspect of public health concerns.

The finding indicates that the composite index of economic well-being was 53 on a scale of 0-100 among individuals with no VI, and 46 for individuals having severe VI or blindness. The multivariate estimates also reveal that economic well-being was declining with the increasing severity of VI. The plausible explanation for this phenomenon is the greater burden of VI health expenditure among middle and old-age people. A previous study from India also signifies that the per capita health expenditure of older adults was higher than the overall population (Lee et al., 2018; Mohanty et al., 2023a). People with VI experienced uncontrolled systematic comorbidities, especially among rural and older people, that have impact on their economic wellbeing (Abou-Hanna et al., 2021; Shambhu et al., 2022; Kumar et al., 2023). Therefore, the hospitalisation and out-of-pocket expenditure (OOPE) costs elevate, and households with older people have higher OOPE and catastrophic health spending compared to non-older people households (Kastor & Mohanty, 2018; Pandey et al., 2018).

Another possible explanation for the association between VI and poor economic well-being is a reduction of their economic productivity, especially among older people, due to their inability to work and lack of job opportunities. Visually impaired individuals have lower chances of engaging in better employment and are more likely to be underemployed or unemployed, resulting in their financial instability (Chai et al., 2023; Schur et al., 2017). Despite anti-discriminatory policies and programmes, evidence shows that, at the global level, the average loss of employment associated with MSVI is found to be 30.2%, and those who stay in employment are 20% less productive (Wong et al., 2022). In the Indian context, less than 1% of people with VI are employed in organised sectors despite the progressive intervention of the Right to Persons with Disabilities Act 2016 and 5% reservation in government jobs (Blind Welfare Society, 2023). Even though people with VI are employed in other sectors, they are overrepresented in entry-level, low-skill occupations and experience workplace discrimination and limited career opportunities (Cichy et al., 2015; Iverson et al., 2015; Schur et al., 2017;

Castle, 2024). Educational attainment also plays a significant role in the relationship between economic well-being and VI. When individuals have poor vision or are severely visually impaired, their opportunity for education is affected as a consequence of a lack of income, which results in a lack of job opportunities in later life (Harrabi et al., 2014; Iverson et al., 2015; Chai et al., 2023). These obstructions create income disparities and economic hardship among people who are visually impaired compared to those who do not have vision problems.

The economic well-being of older people is also profoundly affected by the cost of care and dependency. An individual with vision difficulties loses the ability to work or care for themselves, and it makes it more difficult to perform their daily basic and instrumental activities (Pascolini & Mariotti, 2012; Varadaraj et al., 2021; Kumar et al., 2023). Previous studies also identify that vision loss imposes a greater burden on dependency on instrumental activities, so they may be more likely to require long-term care (Langelaan et al., 2007; Eckert et al., 2015). Caregivers experienced both direct and indirect costs in terms of medication, consultations, hours of unpaid aid and potential costs due to missed employment opportunities (Kumar et al., 2023). A systematic review conducted in 2017 also pointed out that caregivers of VI individuals who have greater difficulty with activities of daily living and need more extensive care are also at higher risk of depression (Kuriakose et al., 2017). Consequently, this impacts the overall economic well-being of older people with visual impairment.

This research demonstrates that men were negatively associated with higher economic well-being. A possible justification for this might be the labour market disadvantages, retirement, lack of social security and saving and financial dependence in old age, especially for men, whereas the societal role and expectations are different for women, which leads to perceive their situation differently (Priyanka & Mishra, 2010; Sharma & Malpani, 2025). Consistent with the previous studies (Eugster, 2019; Gerrans & Heaney, 2019; Xue et. al., 2020), this study also suggests that educated people tend to report better economic wellbeing. This is likely because education helps to develop various skills such as, financial management and planning and making informed financial decisions (Fong et al., 2021).

Further this study verified that healthier people experienced better economic wellbeing as they are more likely to engage in productive activities, seeking financial information and managing their wealth (Xue et. al., 2020). These activities contribute to greater economic wellbeing and overall living standard. Contrarily, the findings indicate that older adults with comorbidities reported better economic wellbeing. This outcome might be associated with reporting bias of

disease. Wealthier people have better access to healthcare service, resulting in higher rate of diagnosis and reporting of chronic diseases. Whilst, people from lower socioeconomic strata have underdiagnosed due to poor access of healthcare services (Mohanty et al., 2023b).

Further, older people living with their children experienced better economic well-being, implying that households are the main caregivers of older people in India, and those living alone are more vulnerable owing to economic insecurity, because many of the older people are out of work and poorer in wealth accumulation (Mohanty et al., 2023a). Lower economic well-being was also denoted among older adults among rural residents. These findings confirm previous assessments (Bloom et al., 2010; Jain & Prakash, 2014) that lower life earnings, a higher burden of medical care costs and limited access to the social security system in rural areas led to financial stress and worsened economic hardship of older people.

Conclusion

In conclusion, the study findings emphasised the association of economic vulnerabilities experienced by visual impairment older adults. Based on the findings, it is suggested to have the target intervention in education and employment opportunities and social protection through a life course perspective. The insight gained from the current research highlights the enhanced accessibility of quality education and improving disability support programmes to nurture economic resilience among visually impaired older people. Further, addressing VI through enhanced public awareness of preventive care, early diagnosis, improved access to treatment, and the adoption of new medical technologies could greatly improve the quality of life for those affected and their families. Such measures could also potentially lower national healthcare expenditures and boost productivity. By prioritising these interventions, India could mitigate the socio-economic impact of VI and support the economic well-being of the ageing population.

DECLARATIONS

Ethics approval and consent to participate

The Central Ethics Committee on Human Research (CECHR) under the Indian Council of Medical Research (ICMR) provided ethical approval for conducting the LASI survey. Analyses and methods were carried out under relevant guidelines and regulations. The survey agencies that conducted the field survey for the data collection have collected prior informed consent (signed and oral) for both the interviews and biomarker tests from the eligible respondents under the Human Subjects Protection.

Availability of data and materials

Data for this study were extracted from the first wave of the Longitudinal Ageing Study in India (2017-18) that is freely available in the public domain on request using the below link:

https://iipsindia.ac.in/sites/default/files/LASI_DataRequestForm_0.pdf

Acknowledgement

Data for this study were extracted from the first wave of the Longitudinal Aging Study in India. (2017-18) conducted by the International Institute for Population Sciences (IIPS), Mumbai, India.

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Tables and Figures

Table 1: Characteristics of the study population in India, 2017-2018

Background characteristics	Total (N)	Percent
Age-group		
45-54	20,578	35.68
55-64	17,676	30.65
65-74	13,675	23.71
75+	5,742	9.96
Sex		
Female	31,114	53.95
Male	26,557	46.05
Education		
No Education	28,941	50.18
Less than 5 years	6,427	11.14
5-9 years completed	12,037	20.87
10 years or more	10,265	17.8
Marital Status		
Currently married	42,925	74.43
Widowed	13,132	22.77
Others	1,612	2.8
Self-Rated Health		
Poor	10,174	17.65
Good	47,468	82.35
Comorbidities		
0	31,334	54.33
1	16,025	27.79
2+	10,312	17.88
Smoke		
No	47,695	82.7
Yes	9,976	17.3
Tobacco		
No	44,139	76.54
Yes	13,532	23.46
Health Insurance		
No	45,745	79.49
Yes	11,802	20.51
Living Arrangement		
Living alone	2,107	3.65
Living with spouse and/or others	9,333	16.18
Living with spouse and children	33,022	57.26
Living with children and/or others	13,208	22.9
BPL Card		
No	31,673	56.16
Yes	24,722	43.84
Subjective Financial Wellbeing		
Finding it very difficult	1,792	3.18
Finding it difficult	8,008	14.2
Just about getting by	21,975	38.97
Doing all right	17,240	30.57

Living comfortably	7,375	13.08
Caste		
ST	4,947	8.59
SC	11,127	19.32
OBC	26,349	45.75
Others	15,168	26.34
Religion		
Hindu	47,552	82.46
Muslim	6,398	11.09
Christian	1,710	2.96
Others	2,009	3.48
Residence		
Rural	40,183	69.68
Urban	17,488	30.32

Figure 1: Prevalence of severity of VI among older adults with distance, near and any VI in India, 2017-2018

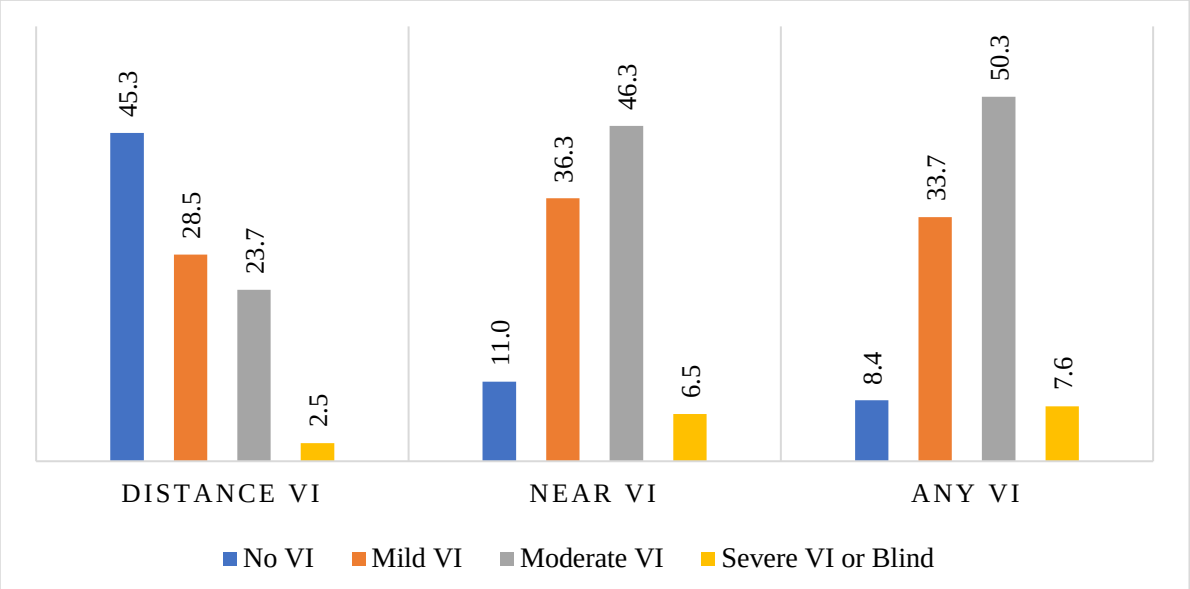


Table 2a: Severity in distance vision loss by background characteristics among older adults in India, 2017-2018

Background Characteristics	No VI	Mild VI	Moderate VI	Severe VI or Blind
Age-group				
45-54	65.86	23.78	9.8	0.55
55-64	44.26	31.34	22.26	2.15
65-74	27.09	32.12	36.75	4.04
75+	14.79	27.83	48.78	8.59
Sex				
Female	42.31	30.2	25.1	2.4
Male	48.07	26.47	22.48	2.98
Education				
No Education	37.22	30.37	28.99	3.43
Less than 5 years	43.81	26.02	27.07	3.1

5-9 years completed	50.73	28.36	19.07	1.84
10 years or more	60.77	24.84	13.18	1.21
Marital Status				
Currently married	49.62	28.03	20.27	2.08
Widowed	28.97	30.64	35.8	4.59
Others	51.19	22.9	23.2	2.71
Self-Rated Health				
Poor	33.42	29.94	32.43	4.21
Good	47.44	28.17	22.05	2.33
Comorbidities				
0	48.13	27.21	22.27	2.38
1	43.14	29.12	25.04	2.7
2+	38.15	31.34	27.03	3.48
Smoke				
No	45.44	28.51	23.46	2.59
Yes	42.69	28.32	25.95	3.04
Tobacco				
No	45.21	28.7	23.52	2.56
Yes	44.15	27.75	25.09	3.01
Health Insurance				
No	44.52	28.37	24.39	2.71
Yes	46.58	29	21.94	2.48
Living Arrangement				
Living alone	31.92	28.57	34.74	4.77
Living with spouse and/or others	40.52	29.15	27.93	2.4
Living with spouse and children	52.16	27.7	18.15	1.99
Living with children and/or others	32.2	29.94	33.65	4.21
BPL Card				
No	46.36	28.49	22.57	2.58
Yes	43.18	28.47	25.58	2.78
Subjective Financial Wellbeing				
Finding it very difficult	35.88	26.21	33.15	4.76
Finding it difficult	40.32	28.68	27.87	3.13
Just about getting by	43.64	28.63	25.07	2.66
Doing all right	47.67	28.53	21.31	2.49
Living comfortably	49.94	28.28	19.69	2.09
Caste				
ST	47.21	25.96	24.64	2.19
SC	42.31	27.75	26.5	3.44
OBC	44.44	29.39	23.5	2.67
Others	47.11	28.2	22.44	2.24
Religion				
Hindu	44.58	28.65	23.99	2.78
Muslim	46.45	29.29	22.44	1.83
Christian	47.45	26.58	23.82	2.15
Others	47.23	23.5	26.15	3.11
Residence				
Rural	42.92	28.14	25.86	3.09
Urban	49.66	29.27	19.37	1.7

Table 2b: Severity in near vision loss by background characteristics among older adults in India, 2017-2018

Background Characteristics	No VI	Mild VI	Moderate VI	Severe VI or Blind
Age-group				
45-54	14.8	41.08	41.26	2.86
55-64	11.29	37.36	45.61	5.74
65-74	7.79	33.09	50.39	8.73
75+	3.46	21.99	55.62	18.93
Sex				
Female	9.24	34.08	49.74	6.95
Male	12.91	38.57	42.03	6.49
Education				
No Education	6.73	32.32	52.39	8.56
Less than 5 years	9.57	37.28	45.71	7.44
5-9 years completed	13.37	38.92	42.57	5.14
10 years or more	20.79	42.96	33.24	3.01
Marital Status				
Currently married	11.96	38.52	44.06	5.46
Widowed	7.48	29.1	52.53	10.89
Others	11.69	30.31	51.19	6.81
Self-Rated Health				
Poor	7.57	30.09	51.88	10.46
Good	11.65	37.44	44.97	5.94
Comorbidities				
0	11.08	37.52	45.54	5.86
1	9.85	35.04	48.1	7.01
2+	12.16	33.7	45.18	8.96
Smoke				
No	11.04	35.91	46.46	6.59
Yes	10.42	37.26	44.89	7.43
Tobacco				
No	11.13	36.15	46.05	6.67
Yes	10.28	36.15	46.63	6.93
Health Insurance				
No	10.55	35.66	46.92	6.87
Yes	12.43	38.04	43.32	6.21
Living Arrangement				
Living alone	7.71	32.7	50.55	9.04
Living with spouse and/or others	10.26	36.72	46.43	6.59
Living with spouse and children	12.45	39.04	43.37	5.14
Living with children and/or others	8.11	29.06	52.37	10.46
BPL Card				
No	12.18	36.98	44.46	6.37
Yes	9.33	35.08	48.39	7.2
Subjective Financial Wellbeing				

Finding it very difficult	7.15	29.42	52.33	11.11
Finding it difficult	8.13	34.02	49.86	7.99
Just about getting by	9.74	35.31	48	6.96
Doing all right	12.74	37.03	44.2	6.02
Living comfortably	14.29	40.62	39.8	5.28
Caste				
ST	9.82	37.26	46.58	6.34
SC	7.85	35.05	49.46	7.64
OBC	11.31	36.52	45.59	6.58
Others	12.88	35.89	44.75	6.48
Religion				
Hindu	10.83	36.48	45.91	6.77
Muslim	11.59	35.98	46.27	6.16
Christian	11.04	29.53	52.82	6.61
Others	11.02	34.46	46.72	7.8
Residence				
Rural	9.25	34.69	48.58	7.48
Urban	14.8	39.5	40.69	5.01

Table 2c: Severity in any vision loss by background characteristics among older adults in India, 2017-2018

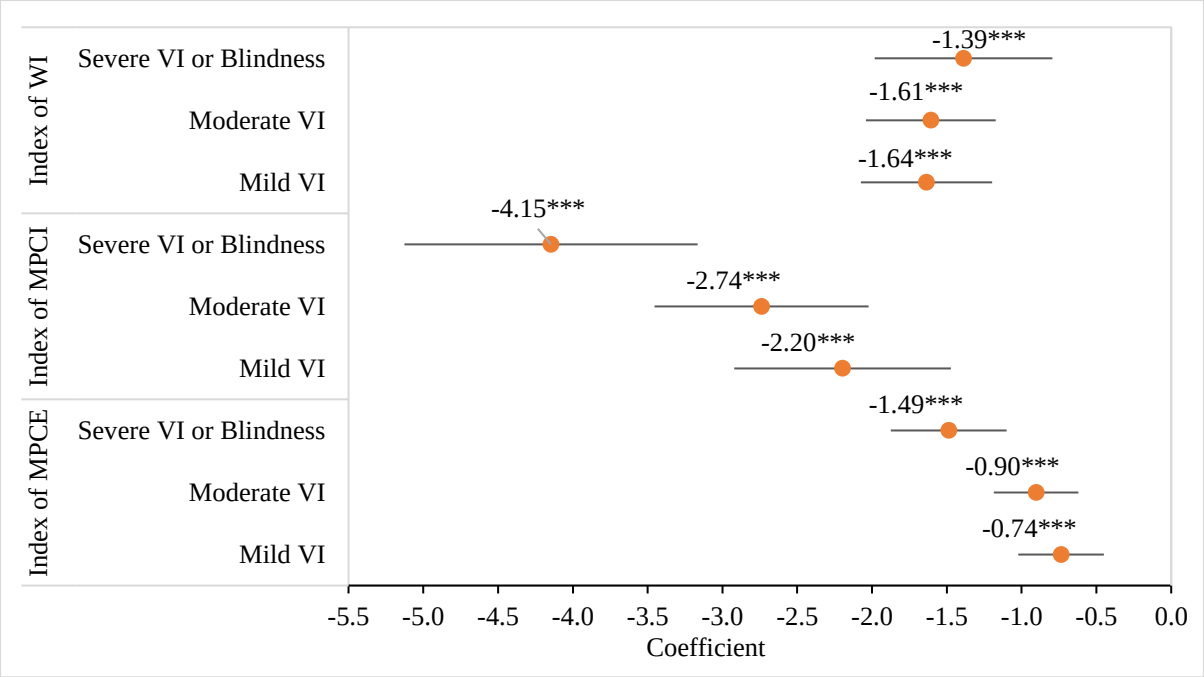
Background Characteristics	No VI	Mild VI	Moderate VI	Severe VI or Blind
Age-group				
45-54	12.85	40.66	43.43	3.06
55-64	8.22	34.99	50.32	6.47
65-74	4.53	28.87	56.24	10.36
75+	2.24	16.32	60.68	20.76
Sex				
Female	7.01	31.94	53.34	7.71
Male	10.03	35.77	46.73	7.47
Education				
No Education	5.01	29.07	56.22	9.69
Less than 5 years	6.9	33.32	51.57	8.22
5-9 years completed	10.51	36.82	47	5.66
10 years or more	16.43	43.35	36.65	3.58
Marital Status				
Currently married	9.51	36.2	48.11	6.17
Widowed	4.66	26.25	56.85	12.24
Others	9.26	27.83	55.14	7.78
Self-Rated Health				
Poor	5.62	26.14	56.62	11.62
Good	9	35.33	48.94	6.74
Comorbidities				
0	8.94	34.61	49.73	6.73
1	7.53	32.57	52.07	7.84
2+	8.13	32.72	49.27	9.88
Smoke				
No	8.6	33.69	50.27	7.43

Yes	7.45	33.75	50.41	8.4
Tobacco				
No	8.51	33.9	50.08	7.52
Yes	8.06	33.05	51.01	7.88
Health Insurance				
No	8.01	33.27	51.01	7.7
Yes	9.92	35.38	47.47	7.22
Living Arrangement				
Living alone	5.76	27.97	55.73	10.54
Living with spouse and/or others	7.63	33.24	51.77	7.36
Living with spouse and children	10.03	37.06	47.07	5.83
Living with children and/or others	5.29	26.54	56.45	11.72
BPL Card				
No	9.42	35.03	48.39	7.16
Yes	7.09	32.01	52.74	8.16
Subjective Financial Wellbeing				
Finding it very difficult	5.69	25.69	56.26	12.36
Finding it difficult	6.32	29.97	54.84	8.87
Just about getting by	7.42	32.36	52.32	7.9
Doing all right	9.72	35.48	48.07	6.73
Living comfortably	11.22	39.66	42.93	6.19
Caste				
ST	8.05	34.25	50.6	7.1
SC	5.85	31.17	54.15	8.83
OBC	8.26	34.56	49.74	7.44
Others	10.64	33.83	48.37	7.16
Religion				
Hindu	8.2	34.06	50.02	7.72
Muslim	9.79	33.65	49.97	6.58
Christian	8.29	27.29	57.38	7.05
Others	8.8	30.88	51.96	8.36
Residence				
Rural	7.12	31.77	52.64	8.47
Urban	11.34	38.14	44.92	5.59

Table 3: Prevalence of severity of visual impairment by index of MPCE, index of MPCI, index of wealth, and combined index of EWB with 95% CI among older adults in India, 2017-2018

Index	Severity of VI	Distance VI	Near VI	Any VI
IMPCE	No VI	38.9 (38.78-39.01)	40.45 (40.2-40.69)	40.18 (39.92-40.44)
	Mild VI	37.84 (37.68-37.99)	38.24 (38.11-38.38)	38.59 (38.44-38.73)
	Moderate VI	37.54 (37.38-37.7)	37.77 (37.66-37.88)	37.79 (37.69-37.9)
	Severe VI or Blindness	35.86 (35.32-36.4)	37.11 (36.82-37.39)	36.85 (36.56-37.13)
IMPCI	No VI	69.45 (69.17-69.72)	72.62 (72.08-73.16)	72.75 (72.15-73.34)
	Mild VI	66.7 (66.33-67.08)	67.95 (67.62-68.28)	68.56 (68.22-68.9)
	Moderate VI	64.09 (63.68-64.5)	65.86 (65.58-66.15)	65.95 (65.68-66.22)
	Severe VI or Blindness	61.92 (60.59-63.26)	63.33 (62.55-64.12)	63.11 (62.37-63.86)
IW	No VI	42.63 (42.42-42.83)	45.94 (45.54-46.34)	46.2 (45.75-46.65)
	Mild VI	39.86 (39.59-40.13)	41.18 (40.94-41.42)	41.77 (41.52-42.02)
	Moderate VI	37.84 (37.55-38.13)	39.07 (38.87-39.28)	39.15 (38.96-39.35)
	Severe VI or Blindness	36.63 (35.69-37.57)	38.32 (37.77-38.86)	37.93 (37.4-38.45)
IEWB	No VI	50.21 (50.05-50.38)	52.91 (52.59-53.24)	52.95 (52.58-53.31)
	Mild VI	48.02 (47.8-48.24)	49.06 (48.87-49.25)	49.58 (49.37-49.78)
	Moderate VI	46.44 (46.22-46.67)	47.44 (47.28-47.6)	47.51 (47.36-47.66)
	Severe VI or Blindness	44.71 (43.98-45.44)	46.23 (45.81-46.64)	45.91 (45.51-46.32)

Figure 2: Estimated adjusted coefficients of visual impairment by index of MPCE, index of MPCI and index of wealth among older adults in India, 2017-2018



Note: Reference category: No VI; * p< 0.05, ** p< 0.01, *** p< 0.001; All the models were controlled for all the covariates considered in the study.

Table 4: Estimated adjusted coefficients of combined economic wellbeing with selected background characteristics among older adults in India, 2017-2018

Background Characteristics	Coefficient	CI 95%
VI Gradient		
No VI®		
Mild VI	-1.5***	-1.9, -1.11
Moderate VI	-1.79***	-2.18, -1.41
Severe VI or Blind	-2.31***	-2.83, -1.78
Age-group		
45-54®		
55-64	-0.32*	-0.57, -0.06
65-74	-1.54***	-1.84, -1.25
75+	-0.68**	-1.09, -0.27
Sex		
Female®		
Male	-0.38**	-0.64, -0.12
Education		
No Education®		
Less than 5 years	1.95***	1.61, 2.3
5-9 years completed	3.49***	3.2, 3.77
10 years or more	8.82***	8.47, 9.16
Marital Status		
Currently married®		
Widowed	0.42	-0.62, 1.46
Others	2.74***	1.56, 3.92
Self-Rated Health		
Poor®		
Good	0.37*	0.09, 0.66

Comorbidities		
No®		
1	1.45***	1.21, 1.69
2+	1.99***	1.7, 2.29
Smoke		
No®		
Yes	-0.25	-0.55, 0.06
Tobacco		
No®		
Yes	-1.19***	-1.44, -0.94
Health Insurance		
No®		
Yes	1.89***	1.63, 2.14
Living Arrangement		
Living alone®		
Living with spouse and/or others	2.17***	1.02, 3.32
Living with spouse and children	0.08	-1.06, 1.21
Living with children and/or others	-1.98***	-2.57, -1.4
BPL Card		
No®		
Yes	-0.71***	-0.92, -0.49
Subjective Financial Wellbeing		
Finding it very difficult®		
Finding it difficult	3.35***	2.72, 3.98
Just about getting by	5.08***	4.49, 5.68
Doing all right	9.22***	8.61, 9.83
Living comfortably	3.6***	2.94, 4.25
Caste		
ST®		
SC	2.51***	2.08, 2.93
OBC	2.77***	2.38, 3.16
Others	5.12***	4.69, 5.54
Religion		
Hindu®		
Muslim	-1.55***	-1.89, -1.21
Christian	0.77*	0.15, 1.38
Others	3.43***	2.87, 4.01
Residence		
Rural®		
Urban	3.83***	3.58, 4.07

Note: ®: Reference category; * p< 0.05, ** p< 0.01, *** p< 0.001.