Purpose: To present the eye care seeking behavior among rural adults in South India. Methods: This cross-sectional study was conducted between 2019 and 2020 covering three blocks of the Thiruvannamalai district, Tamil Nadu, India. Door-to-door survey was performed to collect demographic information, status of literacy, occupation, and details of previous eye examination. Distance visual acuity was tested for individuals available in the house using a log MAR (logarithm of minimum angle of resolution) chart. Association between demographic details, details of previous eye examination, and status of vision was analyzed using logistic regression. Results: A data of 12,913 individuals were included for the analysis, of which 6460 (50.03%) were females. Of the total individuals, 2007 (15.54%) had undergone an eye examination previously. There were 1639 (28.50%) people who had a vision less than 0.2 log MAR in at least one eye. The odds of reported ‘previous eye examination’ were more among females [odds ratio (OR) 1.48, 95% confidence interval (CI): 1.32–1.66, P < 0.001]; individuals aged above 60 years [OR: 11.46, 95% CI: 9.44–13.91, P < 0.001], between 40 and 60 years [OR: 10.43, 95% CI: 8.85–12.30, P < 0.001], and between 18 and 40 years [OR: 2.48, 95% CI: 2.16–2.84, P < 0.001]; illiterates (OR: 1.76, 95% CI: 1.45–2.15, P < 0.001); and farmers (OR: 1.32 95% CI: 1.12–1.55, P = 0.001). Conclusion: The study presents the utilization of eye care among rural South Indian adults. Almost 84.46% of individuals had not undergone any eye examination. Robust measures to promote eye care management would help in effective utilization of eye care services among rural adults.

Key words: Adults, eye care seeking behavior, ocular complaints, rural region, South India, vision impairment

Globally, there are more than a billion people with vision impairment.[1] According to the National Blindness and Visual Impairment Survey 2015–2019, there are approximately 34 million people that are visually impaired in India.[2] The magnitude of vision impairment in India was reported to be higher in rural areas than in urban areas.[3–5] Reducing the burden of vision impairment is the key objective of the National Program for Control of Blindness and Vision Impairment (NPCBVI).[6] Reports from different regions of the country have shown 7–53.0% of eye care seeking behavior (ECSB) among the rural population.[7–12] Less accessibility and affordability, a low socio-economic status, and less awareness about ocular conditions were the common reasons attributed toward decreased utilization of eye care services in rural areas of India.[6–10]

Although most studies have reported utilization of eye care services above 50 years of age, information from all the age groups about eye care seeking behavior in the rural South Indian population is sparse.[13] Moreover, it is also important to see the current status of the ECSB among the rural population as we move toward implementation of Vision 2030.[14] With a strong emphasis on “integrated eye health” with the ‘primary health care’, as recommended by the World Health Organization, it is important to understand the perspectives of the rural masses in reaching out for eye care. Hence, this study aims to report the eye care seeking behavior of the predominant rural community from Thiruvannamalai, one of the largest and backward districts in Tamil Nadu, South India.

Methods

Study setting and sample

This is a cross-sectional survey conducted from 2019 to 2020 in Thiruvannamalai district, Tamil Nadu, India. This study was a part of a project aimed at conducting a comprehensive eye screening to the villages in the district. Tamil Nadu is located in the southernmost part of India, and Thiruvannamalai is the largest district located in the northern part of the state. Being an economically backward district, the total population of Thiruvannamalai is approximately 2.4 million people, of which 49.85% are females and 79.92% belong to rural locations according to the recent census.[15] Agriculture is one of the main occupations of this district. There are totally 18
blocks (sub-districts) in this district, and the block-wise details of the district were obtained from the district administrative office. Chetpet, Polur, and Arani were the blocks/sub-districts closer to secondary center of the institution and were included in the study. Villages from these sub-districts within a radius of 50 kilometers from the secondary center of the institution were randomly selected. The number and location of streets, the number of households, and members of each household were enumerated from the Census information with the help of the local authorities. A total of 34 villages from three sub-districts were included and visited during survey. Trained volunteers from the institution were involved in the survey along with the social workers. Survey questions were closed ended. The team visited the village, and the survey was administered to those who were available in the house. Adults who were present in the house answered the survey for themselves and for the other family members. Information on demographic details, literacy, occupation, previous eye examination, and the presence of ocular complaints were included in the survey. Ocular complaints reported by the participants were classified into vision-related problems. Clouding of vision and/or used local language word for ‘cataract’ were grouped under cataract-related complaints. External eye conditions include tissue growth and cyst and associated ocular symptoms such as redness or eye pain. The survey team administered the questions in the local language and later translated the responses into English. The details of the survey questionnaire are given in Table 1.

Apart from the survey, vision testing was performed by the survey team using a pocket vision screener [an illuminated log MAR (logarithm of minimum angle of resolution) chart with 6/9 optotypes] for individuals who were available during the survey. The team was trained on conducting the survey and vision screening along with a brief session on communication skills. Members in each household were tested, and those who were not present at the house were also included by testing those present in the fields/other places such as panchayat offices in the villages. Their addresses were noted and matched with the records from the villages.

Following the survey, a comprehensive eye examination including refractive error assessment, anterior and posterior segment examination, and intra-ocular pressure estimation was performed. Those identified with ocular conditions were referred to the base hospital. The results of the survey including the eye care seeking behavior and its association with demographic details are presented in the current study.

**Ethical considerations**

The study was approved by the Ethics Committee of the Vision Research Foundation, Chennai, and the study followed the tenets of the Declaration of Helsinki. Permission was obtained from the District Blindness Control Society of the the State Health department. The order from the government was provided to the village administrative authorities. Village authorities conveyed information to the public and supported the process.

**Definitions**

Vision impairment was defined as the presenting visual acuity of less than 0.2 log MAR in at least one eye. Occupation was classified into employed, unemployed, and farmers, and literacy was classified into school level education (up to class grade12), higher education (under-graduate and post-graduate), and illiterates. Eye care seeking behavior was defined as any action performed in recognition of symptoms/in prevention of eye problems by the individuals and by those around them.

**Data management and analyses**

The data were entered in Microsoft Excel 97-2003, cleaned, coded, and used for further analyses. All statistical analyses were performed using Statistical Package for the Social Sciences version 17.0 (SPSS Inc., Chicago, IL.) Multi-variate analysis using multiple logistic regression was performed to understand the association between the demographic variables and previous eye examination. The fitness of the regression model was assessed through Hosmer–Lemeshow test for goodness of fit.

**Results**

A total of 12,913 individuals were included in the survey from 34 villages, of whom 6460 (50.03%) were females. There were 3099 (24.0%), 5178 (40.10%), 3150 (24.39%), and 1486 (11.51%) participants below the age of 18 years, between 18 and 40 years, between 40 and 60 years, and above 60 years, respectively. The mean age of the participants was 35.02 ± 20.41 years (range: 1 month to 110 years). About 9127 (70.68%) individuals were literate, of which 7356 (56.97%) have completed their school education and 1771 (13.71%) have completed their higher education. A total of 2094 (25.14%) were employed, 2437 (29.26%) were unemployed, and 3797 (45.59%) were farmers.
Of the total individuals, 2007 (15.54%) had undergone an eye examination previously, and among them, 1860 (92.68%) had visited a hospital, 28 (1.40%) had visited nearby clinics, and 119 (5.93%) had performed their eye examination in vision screening camps.

There were 1448 (11.21%) individuals who self-reported to have ocular complaints, and among them, 1403 (10.87%) had vision-related problems, 18 (0.14%) reported having problems related to cataract, seven (0.05%) had problems related to growth of tissues on the ocular surface, and 20 (0.15%) had associated ocular symptoms.

Among those with any of the ocular complaints, 611 (4.73%) had a previous eye examination.

Vision testing was performed for 5751 (44.54%) individuals, of which 2709 (20.98%) were males, 1047 (8.11%) were below the age group of 18 years, 2321 (17.97%) were between 18 and 40 years, 1614 (12.50%) were between 40 and 60 years, and 769 (5.96%) were above 60 years. Of the total individuals, 1639 (28.50%) had a vision less than 0.2 log MAR in at least one eye, and among them, 722 (5.59%) had a previous eye examination and 1345 (10.41%) had reported to have any ocular complaints.

The association between individuals who had undergone previous eye examination, vision impairment, and the demographic details is given in Table 2.

Multi-variate logistic regression adjusted for other variables showed that a higher number of females [odds ratio (OR) 1.48 (95% confidence interval (CI): 1.32–1.66, P < 0.001] had undergone previous eye examination than males (43.69%, 95% CI: 41.54–45.88). When compared to individuals less than 18 years (10.09%, 95% CI: 9.67–12.40), individuals aged above 60 years (OR: 11.46, 95% CI: 9.44–13.91, P < 0.001), between 40 and 60 years (OR: 10.43, 95% CI: 8.85–12.30, P < 0.001), and between 18 and 40 years (OR: 2.48, 95% CI: 2.16–2.84, P < 0.001) had sought their eye examination. Individuals who were illiterates (OR: 1.76, 95% CI: 1.45–2.15, P < 0.001) and completed their school education (OR: 1.41, 95% CI: 1.18–1.68, P < 0.001) reported to have had a previous eye examination than individuals with higher education. A higher number of farmers (OR: 1.32, 95% CI: 1.12–1.55, P < 0.001) had sought their eye examination than individuals who were employed (12.50%, 95% CI: 11.13–14.03).

Vision impairment was associated more among the individuals aged above 60 years (37.35%) (OR: 16.96, 95% CI: 8.21–35.02, P < 0.001), between 40 and 60 years (OR: 9.66, 95% CI: 4.80–19.46, P < 0.001), and between 18 and 40 years (OR: 4.23, 95% CI: 2.10–8.52, P < 0.001) than individuals below 18 years of age (2.92%, 95% CI: 2.22–3.86). Vision impairment was also associated more among illiterates (20.55%) (OR: 2.15, 95% CI: 1.18–3.94, P < 0.001) and individuals with school education (10.62%) (OR: 2.00, 95% CI: 1.14–3.50, P < 0.001) than individuals with higher education (4.88%, 95% CI: 3.94–6.03). Individuals without any previous eye examination had more vision impairment (7.10%) (OR: 3.19, 95% CI: 3.97–6.79, P < 0.001) when compared to others with a previous eye examination (5.59%). Vision impairment was associated more with farmers (17.68%) (OR: 2.62, 95% CI: 2.13–3.22, P < 0.001) and unemployed individuals (9.56%) (OR: 1.51, 95% CI: 1.19–1.92, P < 0.001) than employed individuals (8.05%, 95% CI: 6.83–9.47).

Discussion

The significance of the study is the poorer trend of eye care seeking behavior among the villagers in Thiruvananmalai district, South India. Despite Tamil Nadu having sufficient medical facilities and considered the medical hub of India,[18] only about 15.5% of people in this region had undergone a previous eye examination. This proportion is lesser when compared to the studies conducted in rural areas of India (34.1%), Nigeria (19.0%), and Tehran (66.3%).[9,19,20] Less awareness and accessibility were the predominant reasons identified in the literature for less utilization of eye care services.[21] In the current study, 28.50% of individuals had a vision less than 0.2 log MAR and 11.21% self-reported ocular complaints. However, only half of the individuals with vision impairment or with any other ocular complaints had sought eye examination. This indicates that despite noticing a decrease in vision or the presence of any ocular complaints, individuals in this region had not sought eye examination for their problem. The results from this study also report that about 93% of individuals who had undergone an eye examination (n=2007) had visited a hospital. Although there was an awareness about eye conditions and availability of eye care services, less utilization of eye care services in this region is a cause of concern. Priorities of people on other health illnesses over eye care play a major role in utilization of services.[18] Hence, integrating eye care and other health care services might help in effective utilization of health care delivery, especially among people in rural areas.

An interesting point from the study was that eye care utilization was more among illiterates when compared to educated individuals. Although the illiterates from this study have an increased rate of previous eye examination, the amount of vision impairment was also more among them. However, other studies have stated that the eye care utilization was low among illiterates and unemployed individuals.[9,21,22] This result indicates that there exists a progressive change in eye care utilization among illiterate individuals in rural areas, but a further understanding of reasons influencing the eye care seeking behavior might benefit the eye health professionals in planning interventions appropriately.

The current study had a higher number of farmers and unemployed individuals, and there was no association with employment status and previous eye examination. Reasons such as prioritization of work over eye care among the employed group might attribute for the change in eye care utilization in this region. The present study also found that the older age group (above 60 years) had more vision impairment (37.35%) and about 50% of them had sought eye examination. This result is comparable to the study conducted in South India.[9] Restricted mobility and burden of other health co-morbidities were the barriers identified for utilization of services in this age group.[9,22] Hence, measures to increase the eye care delivery at the door step and integrating work and eye and health care services might aid in effective utilization among all categories of people.

Considering the category between 40 and 60 years of age with a need for presbyopic correction, only 23.43% of
individuals had an eye examination. The unmet need of presbyopia amounts to 76% in this study, whereas the global unmet need of presbyopia itself is estimated to be 45%.24 Studies on awareness about presbyopia say that almost 60% of people with presbyopia are not aware about the condition and management.5 Hence, strategies on improving the awareness of presbyopia and demonstration of improvement in the quality of the work might improve utilization of presbyopic services and spectacles. The study has also included the individuals below 18 years of age, and among them, 7.1% (n = 220) had self-reported to have undergone an eye examination and 1.55% (n = 48) had a vision less than 6/9 logMAR. Early detection of ocular abnormalities is required for the promotion of pediatric eye health, and periodic assessments of eye health were recommended beyond 5 years of age.26 Hence, an increase in school eye screening programs and sustained comprehensive eye screening in rural areas might benefit the people in all age groups.

The results from the study state that self-reported ocular complaints, vision impairment, and also utilization of eye care services were more among females. Although a greater number of females had undergone previous eye examination, only 50% of females with ocular problems had sought an eye examination. This result is similar to many studies which report that men seek eye care more than females. Lack of education, financial dependence, and family responsibilities were the common reasons reported as barriers for gender equality in utilizing eye care services.22-25 Evidence suggests that self-help groups support women empowerment and maternal health in rural areas.26-28 Hence, integrating eye care services for such groups might reduce the gender inequality issues in eye care utilization among rural regions of South India.

Although all attempts were made to probe about the detailed use of eye care services and self-reported ocular complaints, there could be an effect of recall bias. In addition, there is a lack of understanding in barriers and facilitators influencing the utilization of eye care services among individuals in this region. Further studies on association between the eye care seeking behavior, ocular findings, and needs of daily life among individuals might benefit in providing the real view on utilization of eye care services in rural areas.

## Conclusion

In conclusion, the present study reports the eye care utilization among people in rural South India. Almost 84.46% of individuals in this region had never sought an eye examination, and despite the expansion of medical facilities in South India,
the lack of utilization of eye care services in rural areas is a chronic problem. Measures in prevention of ocular problems and increasing the awareness about management of ocular conditions might aid in effective utilization of eye care services among rural areas of South India.

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Conflicts of interest
There are no conflicts of interest.

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