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Original Research Article

A study of equity in availing free adult cataract surgery in northeastern Indian states of Mizoram and Meghalaya

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ABSTRACT

Background: Equitable access to free cataract surgery is essential for eliminating preventable blindness. This study evaluates equity in the uptake and follow-up of free adult cataract surgery in the Northeastern Indian states of Mizoram and Meghalaya.
Methods: A cross-sectional study was conducted over a period of nine months, enrolling adults with operable cataracts. Participants were categorised based on the timing of diagnosis and surgery. Structured interviews were administered to 238 patients (Mizoram: n=100; Meghalaya: n=138) to collect data on demographics, economic status, surgery attendance, and post-operative follow-up. Data were analysed using SPSS to identify determinants of service utilisation and assess disparities.
Results: Significant inter-state disparities were observed. Mizoram demonstrated higher surgery uptake (58% vs. 36%) and post-operative follow-up (95% vs. 45%) compared to Meghalaya. The Meghalaya cohort had a higher proportion of female participants (72% vs. 53%), illiteracy (52% vs. 8%), and low-income individuals (44% vs. 21%). While attendance did not differ significantly by gender or marital status, socioeconomic factors were critical. Higher post-operative attendance was associated with adequate income (77.5% vs. 61.1%, p=0.07) and lower indirect costs. Patients who did not attend follow-up incurred higher mean travel expenses (INR 1119 vs. INR 683, p=0.008). Living with adult children significantly increased attendance for both surgery and follow-up.
Conclusions: Despite the provision of free surgery, uptake and follow-up are inequitable, heavily influenced by socioeconomic status, indirect costs, and household support structures. Targeted interventions to reduce indirect expenses and mobilize family support are necessary to achieve equitable access to cataract care in these regions.

Keywords: Access, Cataract surgery, Equity, Follow-up care, Northeastern India, Socioeconomic factors

INTRODUCTION

The recent National Blindness and Visual Impairment Survey of India conducted between 2015 and 2019, indicated that untreated cataract continues to be the chief cause of avoidable blindness amongst those aged 50 years and older in India.[1] Over the past decade, India made large strides in improving both the cataract surgical rate (CSR) and cataract surgical coverage (CSC), and yet it is not uniformly distributed across the country, specifically in its northeastern regions (NER).[2-7] As we emerge past the Vision 2020: Right to Sight targets and set the agenda for this decade, we understand and acknowledge that inequalities are only to increase unless we act.[8] A recent Lancet global study on effective cataract surgery reiterated the need for emphasis on quality improvements over increasing access to cataract services and recommended equity be embedded in efforts to improve access to surgery, with a focus on underserved groups.[9] India's

NER, because of its geographical location, difficult terrain, extreme weather patterns, and vast hilly region, proves to be a deterrent in access to and provision of normal eye healthcare services to people. This region has also witnessed constant insurgencies and is alienated from the economic resurgence that the rest of the country is experiencing.[10] Difficult geography coupled with socio-political uncertainties renders the population in the NER disadvantaged in terms of eye healthcare access. These differences are also observed between states of NER. Despite such health outcome disparities, scientific research, particularly those related to eye health, emanating out of this region is scanty. Previous research indicated a community prevalence of visual impairment (VI) amongst adults in a north-east Indian state at 8.7%, over 50% of which was attributed to untreated cataracts.[11] Das and colleagues reported a cataract prevalence of 36.7% amongst those attending outpatient departments (OPD) at a tertiary hospital in the state of Tripura.[12] To the best of our knowledge, only one study looked at the barriers to comprehensive cataract surgical services (CCSS) in the region, which reported bad roads and difficult terrain as the chief limiting factor for access.[6]

Narrowing down the inequalities and promoting equitable eye care services informed by equity-focused evidence has been actively advocated for over a decade.[13-16] As India has embarked on an ambitious target to achieve universal health coverage (UHC) for all during the 12th plan period, it is imperative to generate local evidence to help guide and inform policy and practice.[17] To understand the equity dimension of access to CCSS in the NER of India, a cross-sectional study was conducted amongst elderly populations identified with cataracts to determine the nature and extent of inequality in cataract services and to identify the contextual factors affecting the inequitable uptake of cataract surgery.

METHODS

The study was conducted between June 2018 and December 2019. The current paper is based on data from a multicentre, descriptive, observational, cross-sectional study to understand the nature and magnitude of inequities in the uptake of CCSS in the NER of India. In Meghalaya, participants were recruited from Bansara Eye Care Centre serving East Jaintia Hills, and West Jaintia Hills, while in Mizoram, participants were selected from Synod hospital serving Aizawl and Kolasib. The study protocol was approved by the Human Ethics Committee of Martin Luther Christian University, Shillong, and appropriate permissions from the local partnering hospitals were sought.

Study design and setting

We modified and used a model of patient-centered access to health services advocated previously to suit the context of vision-impairing cataracts (Figure 1).[18] This model contains five stages for patient-centered access to health services (i) perception of need for care, (ii) followed by healthcare seeking, (iii) reaching, (iv) obtaining care, and (v) benefiting from care. The current study evaluated determinants to access from the patient's perspective amongst patients who reached the services and were identified with operable cataracts. This study was implemented in two northeast Indian states of Meghalaya and Mizoram and was done in collaboration with two tertiary not-for-profit partner eye hospitals.

Study participants and sample

The study spanned over nine months and was divided into four distinct time periods viz. (i) pre-study period, (ii) Study period (0 to 3 months), (iii) post-study period-1 (>3 to 6 months) and (iv) post-study period-2 (>6 months).

Inclusion criteria

Inclusion criteria for study participants comprised adults who were 18 years or older, who were identified with an operable cataract. Individuals who provided written informed consent, and complete the interview process were considered eligible for participation.

Exclusion criteria

The exclusion criteria for the study included participants who were unable to provide informed consent, or were unable to complete the interview process.

Depending upon the timeframe for case detection and cataract surgery, each participant was divided broadly into two distinct groups. Participant group 1 were further sub-categorised into three subgroups as 1A: that include those who were identified with and operated for cataracts during the study period, subgroup 1B: include those who were identified with cataracts during the study period but got operated after the study period, subgroup 1C: include those who were identified with cataract during the study period but failed to get cataract surgery even after 6 months. Participant group 2 included those who were identified with cataract prior to the study period but got operated during the study period.

This is a descriptive study, and no formal hypotheses are being tested. Further, the social distribution of the uptake of surgery among those identified with operable cataracts has not previously been assessed, so there was no data on which to base a sample size calculation. Therefore, we did not perform priori power and sample size calculations. However, we aimed to recruit about 10% of the patients from the total annual cataract surgical volumes which were 1,000 and 1,038 surgeries respectively for each of the hospitals during the preceding financial year 2018-2019. Consequently, a total of 100 and 138 patients were recruited from each hospital in these two states. A non-probabilistic purposive sampling approach was adopted to recruit patients who were initially diagnosed with cataracts

at the eye screening camp and reach the hospital for further treatment.

Data collection

Standard research protocols were followed during data collection in accordance with the *Helsinki Declaration*. Each potential participant was contacted by an interviewer trained in the study procedures with the assistance of hospital staff. After the initial case detection at the campsite, patients were referred to the base hospital for further evaluation and treatment. The list of potential candidates for operable cataracts detected at the campsite was obtained from the base hospital. Participants involving the three sub-groups in group one was approached upon their arrival at the hospital and after the completion of their evaluation cycle. Before starting the interview, each participant was explained the nature and purpose of the interview and their written consent for participation sought.

Subsequently, interviews were conducted in an isolated area within the hospital premises using a questionnaire designed specifically to meet the objectives of this study. The average interview time was 45 minutes. The fieldwork was meticulously supervised by field supervisors who also had randomly cross-verified 10% of the completed surveys on the spot immediately after the completion of the interview. Similarly, for participants in group two, a list of those identified with operable cataracts prior to the start of the study was obtained from the hospital and subsequent preparations were made to contact them and conduct interviews upon their arrival for undergoing cataract surgeries. Similar data collection methods and procedures were followed to acquire data from group two participants as well.

Definitions/measures

A questionnaire was designed specifically to meet the objectives of this study based on a thorough literature review. The interview documented demographic characteristics of patients including age, sex, education, distance from the hospital, and history of health problems among others. One round of pilot testing of the study questionnaire were undertaken before the start of the study. Based on these pilot exercises, certain definitions were simplified, revisions in vernacular language translation for Mizo and Khasi were made, and interview techniques improved. Measures of VA were classified into three broad categories as defined by the World Health Organization as good, borderline, or poor. Good outcome was defined as a VA of better than or equal to 6/18 with the available correction; borderline outcome as 6/24–6/60; and poor outcome as <6/60.[19] VA was measured using a tumbling E Snellen chart. All measurements were taken in full daylight with available correction. If VA was <6/18 in either eye, pinhole vision was tested. Interviews were recorded on paper copies.

Data analysis

Microsoft Office Excel 2013 and SPSS software (version 20.0, IBM SPSS science Inc., Chicago, IL) were used for data analysis. Descriptive statistics are reported for relevant quantitative variables. Chi-square tests were conducted to assess the association between the barriers quoted by the individuals and socio-demographic variables. P = 0.05 was considered statistically significant for all the estimates.

RESULTS

Characteristics of the study population

The demographics of people identified with operable cataracts in these two settings varied. In Mizoram, 100 people were recruited and about half (53%) were women, while in Meghalaya 138 were recruited, and almost three-quarters (72%) were women. In both settings, more than 80% of participants were older than 60 years, while a higher proportion of participants in Meghalaya had not completed any education (52%) and had less socioeconomic status (44%) compared to Mizoram (8% and 21% respectively). A higher proportion of participants in Mizoram were widowed (43% compared to 20%) (Table 1).

Table 1: Characteristics of the study population.

Characteristics		Mizoram		Meghalaya	
		Number	Col%	Number	Col%
Sex/gender	Women	53	53.0	99	71.7
	Men	47	47.0	39	28.3
Marital status	Married	52	52.0	108	78.3
	Separated/divorced	2	2.0	3	2.2
	widowed	43	43.0	27	19.6
	Never married	3	3.0	0	0.0
Age group (years)	15-40	1	1.0	1	0.7
	41-60	12	12.0	25	18.1
	61-80	68	68.0	106	76.8
	81 and over	19	19.0	6	4.3
Education	None	8	8.0	72	52.2

Continued.

Characteristics		Mizoram Number	Col%	Meghalaya Number	Col%
	Lower primary	66	66.0	37	26.8
	Upper primary	18	18.0	22	15.9
	Lower secondary	6	6.0	2	1.4
	Higher secondary	1	1.0	5	3.6
	Higher than secondary	1	1.0	0	0.0
Household size	0-2	10	10.0	27	19.6
	3-5	40	40.0	78	56.5
	6-8	40	40.0	27	19.6
	9 and over	10	10.0	6	4.3
Socio economic status income	Just adequate	71	71.0	47	34.1
	Less than adequate	21	21.0	61	44.2
	More than adequate	8	8.0	30	21.7
Socio economic status ladder	1	7	7.0	0	0.0
	2	52	52.0	48	34.8
	3	41	41.0	26	18.8
	4	0	0.0	39	28.3
	5	0	0.0	25	18.1
Total (row%)		100	100.0	138	100.0

Table 2: Social distributions of the attendance at cataract surgery.

Characteristics		Mizoram				Meghalaya			
		Total	% attended surgery		P value	Total	% attended surgery		P value
		Number	Number	Row%		Number	Number	Row%	
Sex/gender	Women	53	28	52.8	0.27	99	35	35.30	0.95
	Men	47	30	63.8		39	14	35.90	
Marital status	Married	52	34	65.4	0.12	108	41	37.90	0.25
	Others	48	24	50.0		30	8	26.70	
Age group	15-60	13	8	61.5	0.78	26	10	38.50	0.73
	>60	87	50	57.4		112	39	34.80	
Education	Grade 0-5	74	43	58.1	0.97	109	40	36.70	0.57
	Grade 5 above	26	15	57.7		29	9	31.00	
Household size	0-2	10	5	50.0	0.71*	27	7	25.90	0.03
	3-5	40	25	62.5		78	35	44.90	
	>5	50	28	56.0		33	7	21.20	
SES income	Adequate or more	79	43	54.4	0.16	77	28	36.30	0.81
	Less than adequate	21	15	71.4		61	21	34.40	
SES ladder	1 and 2	59	31	52.5	0.18	48	16	33.3	0.69
	3 to 5	41	27	65.8		90	33	36.7	

*Fisher's Exact test rather than Chi-squared

Tables 2 and 3 show the distributions of the attendance at cataract surgery and the post-operative follow-up care after the cataract surgery across the socio-demographic characteristics of the study population.

Attendance at cataract services

In Mizoram, 58% of the participants identified with operable cataract underwent cataract surgery (58/100) and 95% of these (55/58) attended post-operative care. In comparison, in Meghalaya 36% of people identified with operable cataracts attended surgery (49/138) and 45% (22/49) went on to attend post-operative care.

Attendance at surgery did not differ significantly across any of the socio-demographic categories, even though a slightly higher proportion of men compared to women (51.1% versus 41.4%, p=0.15), married compared to others [e.g., widowed, divorced, separated] (46.9% versus 41.0%, P=0.39), and those living in a larger household size. The pattern is consistent between the districts for most of the social groups, except for the level of income variable where a higher proportion of those having less than adequate income (71.4%) compared to those having adequate or more income (54.4%) attended the surgery in Mizoram district (Table 2).

In the case of post-operative surgery attendance, however, statistically significant differences were observed between the income status of the study participants. The participants having an income level of adequate or more reported higher attendance at post-operative care (77.5% versus 61.1%, p=0.07).

Table 3: Social distributions of attendance at post-operative follow-up after the cataract surgery.

Characteristics		Mizoram				Meghalaya			
		Total	% attended FUP		Chi-square, P value	Total	% attended FUP		Chi-square, P value
		Number	Number	Row%		Number	Number	Row%	
Sex/gender	Women	28	26	92.9	0.51*	35	16	45.7	0.85
	Men	30	29	96.7		14	6	42.8	
Marital status	Married	34	34	100.0	0.03*	41	18	43.9	0.75*
	Others	24	21	87.5		8	4	50.0	
Age group	15-60	8	7	87.5	0.31*	10	5	50.0	0.72
	>60	50	48	96.0		39	17	43.6	
Education	Grade 0-5	43	42	97.7	0.09*	40	16	40.0	0.15*
	Grade 5 above	15	13	86.7		9	6	66.7	
Household size	0-2	5	5	100.0	0.66*	7	2	28.6	0.35*
	3-5	25	23	92.0		35	18	51.4	
	>5	28	27	96.4		7	2	28.6	
SES income	Adequate or more	43	41	95.3	0.76*	28	14	50.0	0.41
	Less than adequate	15	14	93.3		21	8	38.1	
SES ladder	1 and 2	31	29	93.5	0.64	16	6	37.5	0.47
	3 to 5	27	26	96.3		33	16	48.4	

*Fisher's Exact test rather than Chi-squared

Cost to access surgery and subsequent attendance at post-operative care

The overall cost of attending surgery (incurred by the participants) was negatively associated with attendance at post-operative care. On average, those who didn't attend post-operative care up tended to have spent more to undergo surgery (mean = INR 1119, SD = INR 836) compared to those who attended (mean = INR 683, SD = INR 306, P=0.008). The relationship is even stronger in terms of the amount they spent for transport while returning home after the surgery (average INR 317 versus 126 among those not-attending versus those attending, (p<0.001) (Figure 1). The cost incurred for medicine, however, demonstrate a negative relationship those who attended the post-operative care tended to have spent a higher amount for medicine (average INR 452 versus 362, p<0.001) (Figure 1).

Social capital and service utilisation

The participants identified with operable cataracts who were living with their children within the same compound were more likely to attend both surgery and post-operative care compared to those living away from their children. The relationship was statistically significant in both cases (Table 4).

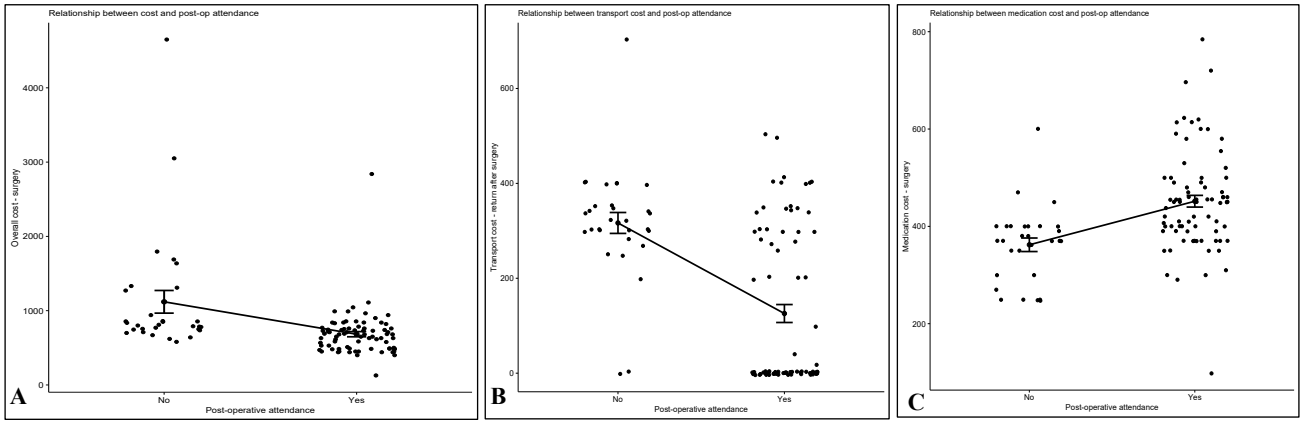

Figure 1 (A-C): The relationship between costs incurred during surgery and post-surgery attendance.

Table 4: The relationship between social capital and service utilisation.

Social capital		Attended surgery				Attended post-op follow up			
		Yes	No	Total	Chi-square, P value	Yes	No	Total	Chi-square, P value
Closest child living in	Same compound	90	78	168	0.001	70	20	90	0.002
	Elsewhere	17	53	70		7	10	17	
	Total	107	131	238		77	30	107	

DISCUSSION

The main aims of this study were to assess the demographic features of cataract patients in Mizoram and Meghalaya, attendance rates for cataract surgery and subsequent post-operative care and determinants of service utilisation, encompassing socioeconomic level, household structure, and social capital. Both locations exhibited significant elderly populations (over 80% aged above 60 years); however, Meghalaya had a greater percentage of women (72%), lower educational attainment (52% lacking formal education), and elevated income inadequacy rates (44% with insufficient income).[7] Mizoram had a greater proportion of widowed individuals (43%). Surgical attendance was greater in Mizoram (58%) compared to Meghalaya (36%).[5] Mizoram exhibited a markedly superior rate of post-operative follow-up attendance (95%) compared to Meghalaya (45%). Social capital, defined as proximity to children, markedly affected attendance, resulting in elevated attendance rates for surgery and post-operative care among participants residing with or in close proximity to their children. Income influenced surgical attendance, as those in Mizoram with insufficient income exhibited a greater attendance rate (71%) compared to those with adequate or higher income (54%). Variations in sample recruitment between the two locations may have influenced the results. Participants in Mizoram and Meghalaya exhibit considerable differences in socioeconomic, geography and cultural backgrounds, which could influence service utilisation patterns.[10] This may result in an overestimation or underestimation of service use rates influenced by regional or demographic factors. Economic and geographic obstacles were also observed as there is an evident correlation between cost and follow-up attendance. For example, elevated transport expenses markedly diminished post-operative attendance, especially for individuals commuting from far regions.[6] A further tendency noted was the poor post-operative attendance in Mizoram. This may be attributed to Mizoram's geographical positioning in hilly terrains relative to Meghalaya.

Additional factors, including disparities in healthcare infrastructure, accessibility of cataract services, and levels of health literacy, were not thoroughly examined but may also affect service attendance rates. The study indicates that socioeconomic characteristics and social capital influence cataract service utilisation; nonetheless, the findings must be approached with care.[8,9] The results are in particular to the contexts of Mizoram and Meghalaya, as regional disparities in socioeconomic status, healthcare accessibility, and cultural practices likely influence the outcomes. These outcomes also enhance the differences between other locations in India or to populations with varying healthcare infrastructures.

This study has several limitations. First, the non-probabilistic purposive sampling from only two hospitals limits the generalizability of our findings to the broader populations of Mizoram and Meghalaya. Second, the cross-sectional design allows us to identify associations but not establish causal relationships between socioeconomic factors and service utilisation.

CONCLUSION

Socioeconomic level and familial proximity significantly influenced attendance rates; nevertheless, generalisations to different contexts should be approached with care. Subsequent research would gain from utilising larger, more representative samples and doing a more thorough investigation of economic and geographic impediments to enhance the external validity of these results.

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