

Factors influencing the uptake of cataract surgery and strategies to improve the uptake in low and middle income countries: A systematic review

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Acronyms

| | |
|--------|--|
| LMICs | Low and Middle Income Countries |
| IAPB | International Agency for the Prevention of Blindness |
| WHO | World Health Organization |
| RCT | Randomized Controlled Trial |
| PRISMA | Preferred Reporting Items for Systematic Reviews and Meta-Analyses |
| CSU | Cataract Surgical Uptake |
| CSC | Cataract Surgical Coverage |
| CSR | Cataract Surgical Rate |
| CASP | Critical Appraisal Skills Programme |
| USD | United States Dollar |

Abstract

Despite significant evidence around barriers hindering timely access to cataract surgery in low and middle income countries (LMICs), little is known about the strategies necessary to overcome them and the factors associated with improved access. Despite significant evidence that certain groups, women for example, are disproportionately affected by low access, even less is known about how to improve the situation for them. Little empirical evidence exists and to date, apart from a review by Ramke et al., 2017 which looked at interventions to improve access of cataract surgical services and only focussed on RCT studies, no other review of that evidence has been conducted. The aim of this systematic review was to collate, analyse and synthesise evidence from both published and unpublished studies on factors influencing uptake of cataract surgery and strategies to improve the uptake in LMICs. We performed a literature search of five databases, and a detailed reference review to identify studies with evidence on factors that influence uptake of cataract surgery and strategies that can be applied to improve the uptake in LMICs. The review identified several strategies that have been suggested to improve uptake of cataract surgery including: adequate counselling; use of successfully operated persons as champions; health education; regular community outreaches; and ensuring high quality surgeries. Our findings provide the basis for the development of targeted combination of strategies to improve access to cataract surgical services by integrating these enabling factors. Future research should seek to examine the

effectiveness of these strategies and identify other relevant factors associated with intervention effects.

Introduction

Cataract occurs when the normal clear lens of the eye becomes cloudy leading to gradual, progressive loss of vision often in both eyes (1). Cataract is a major cause of visual impairment globally, affecting 20 million people, who are blind (1, 2) and another 65 million, who have moderate or severe visual impairments due to cataract. Women and people living in low and middle-income countries are disproportionately affected by cataract (3, 4).

Cataracts are primarily an age related disorder, however other factors may increase risk of cataract, including sex, socioeconomic status, ethnicity, corticosteroid use, smoking, alcohol, diabetes mellitus and other morbidities (5). Although cataracts cannot be prevented, a cost-effective surgery can restore vision (5). Studies have suggested that a successful cataract surgery has a positive impact on individuals' life including their quality of life and their ability to return to economic activities. However, despite technical advances in the management of cataract, the volume of cataract surgeries in low- and middle-income countries remains inadequate. This can be due to a combination of supply-side (provider) and demand-side (patient) factors. Supply-side factors may include weak health systems, poor infrastructure and inadequate human resources. Demand-side factors may include insufficient community awareness, fear of surgery, insufficient family income, cultural beliefs and distance to healthcare facilities (6, 7).

Despite the available evidence on barriers to cataract services (7-10), there remains a need to better understand how these barriers affect different population sub-groups. There is also an urgent need to identify strategies that work to overcome these barriers in different contexts (11-14). Several studies have been conducted to identify such strategies, and in 2017, Ramke et al published a systematic review, which examined strategies to reduce eye health inequalities through cataract interventions focusing on disadvantaged groups (15). The eligibility criteria for their review included randomized controlled trials (RCTs), quasi-experimental studies, before and after designs and time-series. Out of 2865 studies identified in the search, only two studies, both conducted in China, met the inclusion criteria. To the best of our knowledge, there is no other systematic review that has synthesized evidence on factors affecting cataract surgery uptake or strategies to improve it, using a broader range of study designs.

In this systematic review, we aimed to synthesize all available literature to identify factors influencing patient uptake of cataract surgery as well as strategies for improving it in LMICs. In addition, we assessed how factors influencing patient's decision and strategies vary in specific population sub-groups, more specifically, women, people in lower socio-economic groups and people with disabilities.

The following research questions were addressed in this review:

1. What is the reported uptake of cataract surgery in LMICs?
2. Which factors influence the uptake of cataract surgery in LMICs?

3. Which strategies have been reported to improve the uptake of cataract surgery in LMICs?

Methods

The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for the reporting of this systematic review (16).

Outcome measures and study designs

The primary outcome measure of interest was cataract surgical uptake (CSU). This is measured as the proportion of people who having been referred to surgery, have undergone surgery. This is most often measured within cohorts of cataract patients identified through screening activities or in cohorts of patients diagnosed with cataract, some of whom would have had a surgery and others would have not.

Search strategies

Two review authors (EM and BV) independently conducted a search of relevant bibliographic databases including MEDLINE, CENTRAL, EMBASE, LILACS, and ISRCTN. Search terms used a combination of key words such as 'cataract surgery' and 'facilitators' (appendix 1). In addition, the cataract evidence gap map (17) was searched and, references of the included studies were screened to ensure that all relevant studies were included in the review. No restrictions were applied on publication date in the search strategy and therefore all studies ever published through January 2019 were considered.

Inclusion and exclusion criteria

Inclusion criteria for this review consisted of studies a) containing primary data on facilitators of the uptake of cataract surgery, b) conducted in LMICs based on the World Bank classification, c) written in English, Portuguese and French. We included studies regardless of its design. The primary outcome measure was the CSU while the secondary measures were CSC and CSR. In addition, the influencing factors associated with the primary and the secondary outcome measures were also reviewed.

The review excluded all the studies conducted in countries other than those classified by the World Bank as LMICs (18); studies that were in languages other than English, French and Portuguese; and studies whose primary data was not relevant to the review's research questions.

Study Selection and data extraction

Two reviewers (EM and BV) independently screened the titles and abstracts, followed by full-text assessments for eligibility against the inclusion and exclusion criteria. Disagreements were resolved by discussion and consensus between the two reviewers. Data extraction was conducted by the same two reviewers independently. The Cochrane Public Health's data extraction template was customized to extract the data for all included studies allowing the authors to reflect on the aim/research questions of this review (19). Discrepancies were reconciled through discussion between

the two reviewers.

Data extraction and quality assessment

Methodological quality assessment of included studies was conducted by the two reviewers (EM and BV) independently. Disagreement between the reviewers was resolved by discussion. The methodological quality was assessed using an appropriate Critical Appraisal Skills Programme (CASP) checklist for each study. For RCTs we used the RCT CASP checklist while the non-randomized studies were assessed using the respective CASP checklist. This ensured consistency for quality assessment of studies (20). Depending on the CASP assessment, review authors attributed low, medium or high risk of bias for each included study. A study was considered low risk of bias if the study employed appropriate methods avoiding bias, and appropriately reported limitations of studies included. Medium risk was attributed if authors did not fully report the methodology used or used a biased approach but acknowledged it as a limitation of the study and authors do not draw strong policy conclusions. High risk was attributed if the authors used an ambiguously defined or biased approach to conduct the study and do not acknowledge it as limitation.

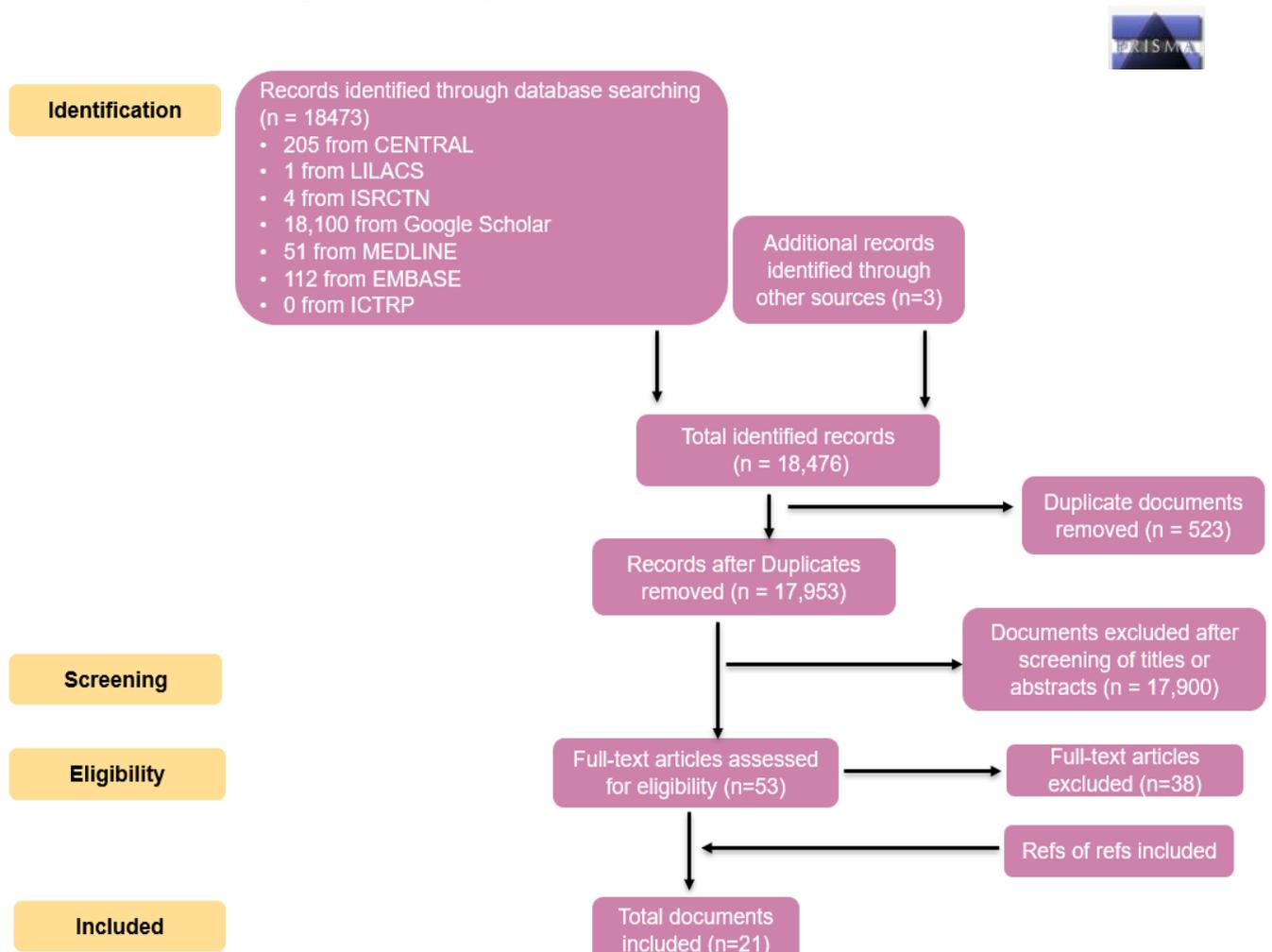
Results

Search results

The database search yielded 18,476 studies. After removing duplicates, 17,955 unique studies were identified and subjected to a screening of titles and abstracts. 53 studies were selected for full-text screening against the inclusion/exclusion criteria. Out of the 53 studies, 15 studies were included in the review based on the inclusion criteria. Studies were excluded if a) study authors did not report factors that influence uptake of cataract surgery or strategies to

improve it, b) studies were not related to our research questions, and c) were not conducted in LMICs. In addition, 6 papers were selected for inclusion by reviewing the references of those eligible studies and as a result, a total of 21 studies were included in the review ([Figure 1](#)). All the studies were written in English and none was found in other languages.

Figure 1: The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram for searching, screening and selection processes of studies included in the review (16)



Description of included studies

Out of the 21 studies, two were RCTs and the other 19 were observational studies, largely cross-sectional surveys, prospective and retrospective cohort studies and qualitative studies. Sixteen studies were conducted in Asian countries: Cambodia (n=2), India (n=8), China (n=4), Pakistan (n=1) and Nepal (n=1); four were conducted in Africa: Ghana (n=1), Zambia (n=1), Madagascar (n=1) and Kenya and Tanzania (n=1). One study was conducted in three countries, two Asian countries (Bangladesh and Philippines) and one African country (Kenya). The majority of included studies reported on more than one objective of this review: 9 reported the CSU (21-29); 11 reported the associated influencing factors (21-23, 26, 29-35); and 8 studies reported strategies to improve the CSU (23, 24, 27, 28, 31, 32, 36, 37) ([Table 1](#)).

Table 1: Characteristics of included studies

| S/N | Study reference | Study location and population | Study design | Results | | | Risk of bias |
|-----|----------------------------------|---|---|--|---|---|--------------|
| | | | | Reasons for low uptake of cataract surgery among women | Uptake of cataract surgery | Factors associated with uptake and strategies to improve it | |
| 1 | Liu et al., 2012 (24) | China – Guangdong; patients aged 50 years or older presenting with visual acuity (PVA) less than 6/18 in one or both eyes due to cataract | Randomized control trial | | Surgery was accepted by 31.1% of intervention patients and 34.2% of controls (P > 0.50) | | Low risk |
| 2 | Xiu Juan Zhang et al., 2013 (28) | Northwestern China, Pucheng County of Shaanxi Province people aged 50 years | Community-based randomized interventional study | | Over the study period, 15.1% in group 1, 29.1% in group 2, 31.1% in group 3, and | | Low risk |

| S/N | Study reference | Study location and population | Study design | Results | | | Risk of bias |
|-----|--|---|---|--|---|--|--------------|
| | | | | Reasons for low uptake of cataract surgery among women | Uptake of cataract surgery | Factors associated with uptake and strategies to improve it | |
| | | and over with operable cataract | | | 28.0% in group 4 underwent cataract surgery | | |
| 3 | Neyhouser et al., 2018 (33) | Cambodia targeting both men and women with existing eye problems identified by Village health volunteers | A cross-sectional qualitative study | | | Socio-cultural factors, beliefs, fear of surgery, limited access and control over resources by women, economic constraints, limited availability of eye services at the lower level health facilities and long distances to the referral hospitals and limited human resource for eye health | Medium risk |
| 4 | Ackuaku-Dogbe, Yawson, & Biritwum, 2015 (21) | Ghana. Study population comprised of individuals aged 50 years and above from both rural and urban settings | Survey was undertaken as part of a multi-country longitudinal study to complement existing ageing data sources. | | Overall cataract surgical uptake was 48.9%; women 48% compared to 49.1% men | Gender, having national insurance | Medium risk |

| S/N | Study reference | Study location and population | Study design | Results | | | Risk of bias |
|-----|--|--|---|--|--|---|--------------|
| | | | | Reasons for low uptake of cataract surgery among women | Uptake of cataract surgery | Factors associated with uptake and strategies to improve it | |
| 5 | Amritanand, Jasper, Paul, & Kuriakose, 2018 (22) | Southern India All bilaterally cataract blind patients who underwent surgery through outreach services from June 2015 to May 2016 | Retrospective cross-sectional study design | | 88.8% underwent cataract surgery | Facilitating factors: Neighbours and acquaintances (48/168, 28.6%); general medical personnel (34/168, 20.2%); persons who had earlier undergone cataract surgery (33/168, 19.6%); and family members (27/168, 16.1%). | Medium risk |
| 6 | Finger et al., 2011 (23) | Southern India | Cross-sectional study integrated into outreach clinics run in two districts by Sankara Eye Centre | In situations of both husband and wife having cataract, the men favoured themselves and felt they needed to undergo surgery first before their wives | Overall acceptance of surgery was 91.7%. Acceptance was higher in Viluppuram with regular outreach than in Karur where outreach was irregular (94.6% vs. 82.3%, P < 0.001). Male | Patients with previously operated cataract in one eye were more likely to accept (49% in Viluppuram and 51% in Karur; P = 0.085. Attending regular outreach and having had first eye cataract surgery were independent predictors of acceptance in a logistic regression model. Acceptors were more likely to live in | Medium risk |

| S/N | Study reference | Study location and population | Study design | Results | | | Risk of bias |
|-----|--|--|---|--|--|---|--------------|
| | | | | Reasons for low uptake of cataract surgery among women | Uptake of cataract surgery | Factors associated with uptake and strategies to improve it | |
| | | | | | acceptors were 50.4% vs 49.6% female acceptors | smaller households and in supportive families than non-acceptors who lived in larger families which could not provide support (P < 0.001) | |
| 7 | Orbis, 2016 (38) | Zambia, North Western Province, Mwinilunga District targeting female cataract patients who did not access services | A cross-sectional qualitative study | Use of home remedies; traditional and religious beliefs; Seeking a second opinion; Waiting for cataracts to mature; Limited counselling provided; Fears of surgery; Lack of women autonomy; and Cost | | | Medium risk |
| 8 | Radhakrishnan, Venkatesh, Valaguru, & Frick, 2015 (34) | Rural areas of Theni district, Tamil Nadu, India | Cross-sectional survey of four randomly selected village clusters | | | Respondents who were less likely to be “not willing” to take up surgery include: those from Muthalapuram village, married and | Medium risk |

| S/N | Study reference | Study location and population | Study design | Results | | | Risk of bias |
|-----|---|--|--|--|---|---|--------------|
| | | | | Reasons for low uptake of cataract surgery among women | Uptake of cataract surgery | Factors associated with uptake and strategies to improve it | |
| | | | | | | those with good understanding of cataracts | |
| 9 | Syed et al., 2013. (26) | Kenya (Nakuru district), Bangladesh (Satkhira district) and the Philippines (Antique district and Negros Island); participants aged 50 years and with a best corrected VA of 56/24 in the better eye due to cataract | Population-based before and after survey | Fear of surgery | Uptake of surgery was 58.6% in Kenya, 53.9% Bangladesh and 47.1% the Philippines; | predictors for acceptance of surgery included: younger age, male gender, worse VA in the better eye, living within a rural setting, | Medium risk |
| 10 | Finger, Ali, Earnest, & Nirmalan, 2007 (39) | Andhra Pradesh State, India; Patients identified with cataract | Qualitative study | In addition to lack of permission and funds women were more likely to delay cataract surgery, especially if the husband required medical or personal | | | Medium risk |

| S/N | Study reference | Study location and population | Study design | Results | | | Risk of bias |
|-----|------------------------|---|---|--|--|--|--------------|
| | | | | Reasons for low uptake of cataract surgery among women | Uptake of cataract surgery | Factors associated with uptake and strategies to improve it | |
| | | | | care due to old age | | | |
| 11 | Liu et al., 2013. (32) | Guangdong Province in rural China hospitals targeting hospital administrators, doctors and nurses | Qualitative study | | | Increased outreach screening, improved surgical quality and lowering of surgical fees were suggested as facilitators | Medium risk |
| 12 | Xu et al., 2018 (27) | Shanghai – China | Population-based, cross-sectional study | | More female subjects (64.6%) than male subjects (35.4%) accepted cataract surgery. | Of the patients with cataract history, 36.4% of surgery patients were equal or older than 80. More people with urban medical insurance received surgery (p = 0.036). Patients who received surgery were more satisfied with local medical service (p = 0.032). In urban area, Lower income and difficulties with commutes were related to a higher rate of surgery | Medium risk |

| S/N | Study reference | Study location and population | Study design | Results | | | Risk of bias |
|-----|--|--|----------------------------------|--|---|---|--------------|
| | | | | Reasons for low uptake of cataract surgery among women | Uptake of cataract surgery | Factors associated with uptake and strategies to improve it | |
| 13 | Nirmalan, Padmavathi, & Thulasiraj, 2003 (29) | South India - People aged 50 years and older from Sivaganga and Tirunelveli districts of Tamil Nadu state; and Palakkad district of Kerala state | Cross sectional population study | | CSR significantly higher for males (n=547, 74.4%) than females (n=736, 60.5%) (p <0.001) | | Medium risk |
| 14 | Cains & Sophal, 2006 (40) | Cambodia, study population not defined | Case study | Poverty, fear of surgery, attitudes towards expenditure on the elderly and Lack of knowledge | | | High risk |
| 15 | Razafinimpanana, Nkumbe, Courtright, & Lewallen, 2012 (25) | Sava Region, Madagascar; People over age 16 identified in the community with cataract and referred for surgery | Prospective cohort study | Cost of getting to a facility where cataract surgery could be done. | The hospital reported a cataract surgery uptake of 24.6%. More females (25.9%) than males (24.1%) accepted cataract surgery | The factors associated with acceptance were proximity to hospital (people from Sambava district were twice as likely to present as people from more distant districts) and perceived price of transport and food (being | High risk |

| S/N | Study reference | Study location and population | Study design | Results | | | Risk of bias |
|-----|------------------------------|---|-------------------------------------|--|---|--|--------------|
| | | | | Reasons for low uptake of cataract surgery among women | Uptake of cataract surgery | Factors associated with uptake and strategies to improve it | |
| | | | | | | higher for people not accepting) | |
| 16 | Haider & Hussain, 2004 (41) | Munawwar Memorial Hospital in District Chakwal, Pakistan | Case study | Eye care costs, Lack of awareness, Lack of programmes friendly to patients' family members | | | High risk |
| 17 | Lewallen et al., 2005 (31) | Kwale District in Kenya and Kilimanjaro Region in Tanzania | Cross-sectional | | | Community programmes are "patient friendly," providing service in one stop | High risk |
| 18 | Fletcher et al., 1999 (30) | Outreach area of Aravind Eye Hospital in Madurai Tamil Nadu, Southern India | Mixed method study | | | Men and persons living 3km or less from the eye camp were more likely to attend the camp | High risk |
| 19 | Snellingen et al., 1998 (35) | Non acceptors of surgery in South Asian, Nepal | cross-sectional retrospective study | female population are traditionally more confined to the household compared to the males | Of 319 cataract patients identified only 45.5% accepted surgery, with men accepting surgery more readily than women | The male population were more likely to accept surgery than females | High risk |

| S/N | Study reference | Study location and population | Study design | Results | | | Risk of bias |
|-----|--------------------------|---|-----------------|--|---|---|--------------|
| | | | | Reasons for low uptake of cataract surgery among women | Uptake of cataract surgery | Factors associated with uptake and strategies to improve it | |
| | | | | | (RR=1.31; 95%CI=1.04–1.67) | | |
| 20 | Kumar, 1998 (36) | India: The eye hospital of the Vivekananda Mission Ashram | Case study | | Uptake of cataract surgery increased from 50% in 1995 before counselling intervention to 90% in 1997 after the intervention | | High risk |
| 21 | Murthy et al., 2001 (37) | India | Cross-sectional | | | Use of daily newspapers can be explored as a mobilization media to improve uptake of cataract surgery | High risk |

Risk of bias in the included studies

As shown in Table 1, we attributed the two RCTs (24, 28) low risk of bias as study authors used appropriate methods to avoid biases and methods were fully reported. Among the 19 observational studies, ten (21-23, 26, 27, 29, 32-34, 38, 39) were attributed medium risk of bias as study authors did partially report methods used or used a biased approach, but acknowledged it as a limitation. The other eight studies (25, 30, 31, 35-37, 40, 41) were attributed a high risk of bias because the methods were ambiguously defined or used a flawed methodology without appropriately reporting it as a limitation.

Reported uptake of cataract surgery

Ten studies reported the uptake of cataract surgery with the rate ranging from 15.1% in north western China to 94.6% in Southern India. The most frequently reported CSU was 31.1%

The lowest CSU of 15.1% was reported in the control group of the RCT study conducted in north western China (28). The highest CSU of 94.6% was reported by a cross-sectional study in southern India in one of the study districts (Viluppuram) where outreach regular compared to the other district (23).

The reported CSU was disaggregated by sex in four studies (21, 23, 25, 27), region or country in four studies (21, 23, 26, 34), socio-economic status in two studies (21, 34), health insurance in two studies (21, 27), age in three studies (21, 27, 34), marital status in two studies (21, 34),

education in two studies (21, 34), religion in one study (21) and awareness on cataract in one study (34).

In one intervention study, the uptake changed between the baseline and endline from 50% in 1995 before the counselling intervention to 90% in 1997 after the intervention.

Which factors influence the uptake of cataract surgery in LMICs?

Factors that were reported to influence the uptake of cataract surgery were from observational studies whose risk of bias was judged to be either medium (11 studies) or high (5 studies). Four studies (32, 33, 38, 39) reporting influencing factors were qualitative.

For the purpose of this review, factors reported in the studies were grouped under several categories: i) patients socio-demographic characteristics (sex (21, 23, 26, 27, 29, 33-35, 39); age (26); marital status and composition of households (26, 34)); ii) patient socioeconomic status and costs of surgery (21, 23, 25-27, 32-34); iii) distance to the health facility and cost of transport (25, 27, 30, 33, 38); iv) patient education and awareness of cataract (21, 27, 34); v) quality of vision, history of cataract and other morbidities (23, 26, 27) or disabilities; and vi) perceived quality of services and experiences of previously operated patients (22, 23, 39).

Socio-demographic characteristics

Sex

Sex was explored, as an influencing factor in eight studies (21, 23, 25-27, 33, 35, 39), six quantitative and two qualitative. Out of the six quantitative studies (21, 23, 25-27, 35), three (25, 27, 35) found significant differences in surgery uptake between men and women. Out of these, two (25, 27) reported higher uptake by women and one (35) reported higher uptake by men. In addition, a multi-country study conducted in Kenya, Bangladesh and Philippines (26), showed that men were more likely to take up surgery in Kenya (OR 2.6, 1.1–6.4) and Bangladesh (OR 3.0, 1.6–5.5) with no sex differences in the Philippines. Similarly, in Nepal (35), men were more likely to take up surgery than women (RR=1.31; 95%CI=1.04–1.67); In contrast in China, the proportion of patients operated out of those with operable cataract was higher among women (19.8%) compared to men (15.6%) ($p=0.0127$). In this study men were statistically significantly less likely to take up cataract surgery in both rural (OR 0.635; 95% CI 0.439; 0.918; $p=0.0158$) and urban (OR 0.66 (95% CI 0.467; 0.931, $p=0.0178$) areas.

The two qualitative studies reporting sex as an influencing factor (33, 39) argued that men were more likely to access cataract services than women. The study in Cambodia (33) identified a number of barriers faced by women, on both the demand side and supply side of the health system, including:

- i) gender-biased socio-cultural norms and stereotypes, which perceived men to be superior to

women and prioritised their health needs over women's health needs;

- ii) Limited decision making autonomy and limited control over financial resources among women making them dependent on their husbands and sons;

- iii) more prevalent traditional and religious beliefs and fears of surgery among women;

- iv) Limited availability of eye care facilities and human resources, increasing travel time and costs of surgery.

The study also reported qualitatively on the intersectionality between different factors. Elderly women from lower socio-economic backgrounds living in remote rural areas were the most vulnerable group identified in this study.

In India (39), although women were more likely than men to report a need for sight to be able to do their household tasks, they were more likely to delay their cataract surgery, especially when living with a husband who also required a surgery or another type of medical care. Similarly, in Zambia (38) women were more likely to delay their surgery, use home remedies or ask for a second opinion than men. Similarly to the study in Cambodia, both studies (38, 39) showed that the lack of authority, limited access to financial resources and fears of surgery or travelling outside the local community were important factors contributing to the lower uptake of surgery by women. In India (39) the authors argued that men were more likely to be supported by their sons and other family members than women; many women in this study were widowed and their children lived far away

and could not accompany their mothers to the hospital.

Age

Three studies explored age as a predictor of cataract surgery uptake (25-27). The multi-country study (26) conducted in Bangladesh, Kenya, and Philippines reported that younger patients (50–60 years) were more likely to take up surgery than those of older age (>70 years), OR 2.8, 1.5–5.3; OR 6.2, 1.7–22.8 and OR 2.1, 1.2–3.7 respectively. In contrast in China (27), the uptake of surgery was higher among older patients, 26.8% among those aged 80+ years compared to 14.6% among 50-60 year olds. People in the oldest age group (>79 years) were significantly more likely to take up surgery than those aged 50-60 years but the difference was stronger in urban (OR 4.132 (95% CI 1.808; 9.444, $p=0.0008$) than rural (OR 1.841 (95% CI 0.947; 3.582, $P=0.0721$) areas. In Madagascar (25) there was no association between age and the uptake of surgery.

Marital status and composition of households

Five studies examined the role of marital status and composition of households (21-23, 25, 34).

A study from India (34) showed some associations between being married and higher uptake of surgery (p -value<0.001), although the association became statistically insignificant after the adjustment for other factors (OR 0.40, 0.14-1.18). In Madagascar (25) there was no association between marital status and uptake of surgery.

A study in India however, showed that those, who accepted cataract surgery tended to live in smaller households with

more close and supportive families than those, who did not accept surgery ($P < 0.001$) (23). Another study from Southern India (22) showed that the lack of family to accompany an old person with cataract to the hospital was one of the key barriers to the uptake of surgery named by nearly 23% of patients interviewed.

Economic status and cost of surgery

Economic status of patients and cost of surgery were examined in nine studies (21, 23, 25-27, 32-35). Four of these studies were quantitative from Ghana (21), China (27) and India (23, 34) while two were qualitative from Cambodia (33) and China (32). The evidence on the role of economic factors in these studies is mixed.

In one of the India studies (33), many of those, who were “not willing” to undergo surgery were not working ($n=27$ (55.10%)), reported low (<Rs. 24,000) annual household income ($n=30$ (61.16%)); and had no listed household wealth items ($n= 36$ (73.47%)). Lower uptake of surgery was also linked to economic constraints in one study in China (32) and in the multi-country study in Kenya, Bangladesh and Philippines (26).

In the Ghana study (21) however the uptake of surgery by patients with higher incomes was only marginally higher (50%) than in the lower income group (47.7%) (p -value=0.364). Similarly in both Madagascar (25) and Nepal (35), the cost of surgery was not the main factor taken into consideration, when making a decision about surgery. Other factors, such as being away from home or regular income generating activities appeared to be more important in these contexts. In another study in India (23) people, who

did not accept cataract surgery reported a higher monthly household income (>500 Indian Rs) than those who accepted the surgery (70%vs.49%, $p < 0.001$). Similarly in China (27), people on high incomes (>5000) were less likely to take up surgery than those on low incomes (OR 0.501 (0.313;0.804, $p=0.042$), although further analysis showed that this difference was true for urban residents only. There were no income differences between those who took up surgery and did not take up surgery in rural areas.

Two studies compared uptake of cataract surgery among people with and without health insurance. In both studies the uptake of surgery among people covered by health insurance was higher than for those, who were not covered (54.7% and 42.1% respectively in Ghana (21) and 92.1% and 87% respectively in China (27)). However, in both studies, the difference was not statistically significant.

Distance to health facilities and cost of transport

Five studies, two quantitative (25, 27), two qualitative (33, 38) and one mixed methods study (30) reported distance to health facilities and costs of transport as factors influencing the uptake of surgery. In Madagascar (25), people living closer to a health facility (Sambava district) were twice as likely to present for surgery than those from more distant districts. Similarly in India (30), persons living within three kilometres from the eye camp were more likely to attend it than those living further away (odds ratio, 4.5; 95%CI,1.7-12.5).

Both qualitative studies from Cambodia (33) and Zambia (38) reported that the cost of transport to the district hospital was an important factor to consider for many patients and even when the surgery

was offered for free, the associated costs of travel and food were barriers to surgery uptake for many patients.

Only in China (27), longer commute time was associated with higher uptake of surgery. However, the difference was true for urban dwellers only ($p = 0.0115$).

Patient's education and awareness of cataract

Three studies examined education as an influencing factor (21, 27, 34).

In two studies, awareness of cataract was reported to be an influencing factor. A cross sectional survey conducted in India (34) showed that households with good understanding of cataract were less likely to say that they are unwilling to undergo cataract surgery (OR 0.32; 95% CI 0.15;0.69; $p = 0.003$). Similarly in China (27), awareness of cataract was significantly correlated with the surgery uptake (OR (1.034 (1.028, 1.040), $p < 0.0001$). On the other hand, in Ghana education levels of the older adults did not greatly influence cataract surgical uptake (21).

Quality of vision, history of cataract and other morbidities or disabilities

Two studies (22, 23) presented quality of vision, history of cataract surgery and presence of other co-morbidities or disability as one factor that influenced CSU. In one of the studies conducted in southern India, other comorbidities were reported as a factor preventing patients from seeking eye care services (22). In another India study, those who had already undergone cataract surgery in one eye were more likely to accept surgery than those who were being identified with cataract for the first time ($P < 0.001$). Also, people

with other co-morbidities were more likely not to accept surgery compared with those who did not have other illnesses (23).

Perceived quality of services and experiences of previously operated patients

Four studies one from China (32) and three from India (39) reported that the perceived quality of surgery and experiences of other patients were important influencing factors for patient's decision to take up or not to take up surgery. In China (32), improving surgical quality was ranked high by both medical personnel (doctors and nurses) and hospital administrators

involved in cataract service delivery. In India (39), patients who reported speaking to someone who had had good surgery experiences were more likely to take up cataract surgery than those who did not have such experiences. Neighbours, family members and acquaintances were among the most common factors facilitating the uptake of surgery in two India studies included in this review (22).

The table below represents the studies that reported factors associated with higher uptake, either because there was statistical significance, or they were reported qualitatively

Table 2: Factors that were associated with higher uptake of surgery

| Factors associated with higher uptake of cataract surgery | Study name | Study design and setting | Finding |
|---|------------------------------|--|---|
| Male gender: | Snellingen et al., 1998 (35) | Cross-sectional retrospective study conducted in Nepal and involved interviewing 96 non-acceptors of surgery 1 year after an offer to undergo surgery. The interview included questions on visual function, quality of life, and socioeconomic variables on acceptance of cataract surgery | The male population were more likely to accept surgery than females (RR=1.31; 95%CI=1.04–1.67) |
| | Syed et al., 2013 (26) | Population-based before and after survey in Kenya, Bangladesh and Philippines. In Kenya and Bangladesh, all cases were offered free cataract surgery and reimbursement of transport expenses while in Philippines, these costs | Participants were more likely to go for surgery if they were male in Kenya (OR 2.6, 1.1–6.4) and Bangladesh (OR 3.0, 1.6–5.5) |

| Factors associated with higher uptake of cataract surgery | Study name | Study design and setting | Finding |
|---|--|---|---|
| | | <p>were subsidized for those who could not afford the fee. Cases were then visited up to four times in their homes to encourage them to take up surgery</p> <p>At baseline and follow-up, participants were interviewed in their home and in their local language by trained interviewers</p> | |
| High household income | Radhakrishnan, Venkatesh, Valaguru, & Frick, 2015 (34) | A cross-sectional survey of four randomly selected village clusters in rural areas of Theni district, Tamil Nadu, India, was conducted to elicit the willingness to pay for cataract surgery by presenting “scenarios” that included having or not having free surgery available | Sufficient income was qualitatively associated with high uptake though by logistic regression it was not significant |
| Living in supportive families | Finger et al., 2011 (23) | Cross-sectional study integrated into outreach clinics run in two districts by Sankara Eye Centre, Coimbatore, and Southern India. A semi-structured questionnaire was administered to patients who had attended outreach eye clinics and either accepted or not accepted the offer of cataract surgery | Those who accepted surgery were more likely to live in supportive families than non-acceptors who lived in families which could not provide support (P < 0.001) |
| Proximity to the health facility | Fletcher et al., 1999 (30) | Mixed method study - a routine eye camp was conducted within 5 km of each of 48 randomly selected villages of typically Hindu, backward-caste communities. Subsequently, participatory rural appraisal—community mapping, focus groups, | persons living 3km or less from the eye camp were more likely to attend than those living further away (odds ratio, 4.5;95%CI,1.7-12.5) |

| Factors associated with higher uptake of cataract surgery | Study name | Study design and setting | Finding |
|---|--|---|---|
| | | matrix ranking, and semi structured interviews—was undertaken to explore community views of eye problems. An eye examination was conducted on persons with eye problems who did not attend the eye camp. Predictors of attendance were identified by multilevel regression analysis | |
| | Razafanimpanana, Nkumbe, Courtright, & Lewallen, 2012 (25) | Prospective cohort study carried out in Sava region of Madagascar. People with blinding (16/60) cataract were identified by cataract case finders in the community, interviewed, and given a referral card for surgery at the hospital. Uptake of surgery was monitored at the hospital by interviewing those referred. | People from Sambava district were twice as likely to present as people from more distant districts; RR =1.8 (1.1–3.2); P-value=0.04 |
| Positive experiences from previously operated patients | Finger et al., 2011 (23) | Cross-sectional study integrated into outreach clinics run in two districts by Sankara Eye Centre, Coimbatore, and Southern India. A semi-structured questionnaire was administered to patients who had attended outreach eye clinics and either accepted or not accepted the offer of cataract surgery | Those who accepted the surgery were more likely to have positive information about the surgery compared to those, who did not accept the surgery (49% vs.11% respectively; P < 0.001) |
| | Finger, Ali, Earnest, & Nirmalan, 2007 (39) | Qualitative study - Sixty-one cataract patients from two eye hospitals in Hyderabad, India, were interviewed using convenience sampling. Two focus group discussions with cataract patients and | Patients who reported having spoken to someone who had good experiences with the service provider were more likely |

| Factors associated with higher uptake of cataract surgery | Study name | Study design and setting | Finding |
|---|--|--|--|
| | | interviews with seven key informants helped triangulate the information | to avail themselves for the cataract surgery |
| Availability of health insurance | Ackuaku-Dogbe, Yawson, & Biritwum, 2015 (21) | Survey was undertaken as part of a multi-country longitudinal study to complement existing ageing data sources. A nationally representative sample of 5571 older adults (≥50 years) and a small sample of persons 18-49 years were interviewed to understand cataract surgery uptake among older adults in Ghana | The uptake of surgery among people covered by national health insurance was significantly higher (54.7%) than among those without an insurance (42.1%) |
| | Xu et al., 2018 (27) | Population-based, cross-sectional study in China - A total of 2342 cataract patients older than 50 years old with cataract-induced visual impairment or who had undergone cataract surgery were recruited from rural and urban areas of Shanghai for a face-to-face structured questionnaire | More people with urban medical insurance received surgery (p = 0.036). |
| Better awareness of cataract | Radhakrishnan, Venkatesh, Valaguru, & Frick, 2015 (34) | Cross-sectional survey of four randomly selected village clusters conducted to elicit the willingness to pay for cataract surgery by presenting “scenarios” that included having or not having free surgery available | Households with good understanding of cataract were more willing to undergo cataract surgery (OR 0.32; 95% CI 0.15–0.69; P - 0.003) |
| | Xu et al., 2018 (27) | Population-based, cross-sectional study - A total of 2342 cataract patients older than 50 years old with cataract-induced visual impairment or who had undergone cataract surgery were recruited from | Awareness significantly correlated with the willingness to undergo cataract surgery; OR |

| Factors associated with higher uptake of cataract surgery | Study name | Study design and setting | Finding |
|---|---|--|---|
| | | rural and urban areas of Shanghai for a face-to-face structured questionnaire | (95%CI) = 1.034 (1.028, 1.040), p < 0.0001) |
| Improved quality of surgery | Liu et al., 2013 (32) | Qualitative study - Focus groups (FGs, n ¼ 10) were conducted with hospital administrators, doctors, and nurses at 28 county hospitals in Guangdong Province. Discussions explored respondents' views on increasing surgical volume and quality and improving patient satisfaction. Respondents numerically ranked possible strategies to increase surgical volume and quality and patient satisfaction. | Improving surgical quality was ranked high as a factor to increase surgical volume and respondents suggested that improved training for OR nurses could help improve the surgical quality |
| | Finger, Ali, Earnest, & Nirmalan, 2007 (39) | Qualitative study - Sixty-one cataract patients from two eye hospitals in Hyderabad, India, were interviewed using convenience sampling. Two focus group discussions with cataract patients and interviews with seven key informants helped triangulate the information | The perceived good quality of the provided services was reported to have a strong influence on uptake |

Which strategies improve the uptake of cataract surgical services in LMICs?

In total ten observational studies (21-23, 30-32, 36, 37, 40, 41) reported on strategies to improve uptake of cataract surgical services. The quality of evidence from these studies was rated to be of low quality due to the designs used which did not measure the impact of the strategies and had high and medium risk of bias. In addition, two high quality RCTs conducted in China (24, 28) compared different strategies some of which were reported by the observational studies.

Strategies reported by these studies are discussed below.

- (i) Use of persons who had successfully undergone cataract surgery as champions to encourage and clear any prevailing fears about cataract surgery was reported by a cross-sectional study conducted in India and a case study from Cambodia (22, 40). Both studies reported that persons who have successfully undergone cataract surgery play a key role in explaining to others the process and encourage them to have the operation.
- (ii) Regular outreach screening activities to bring the services near the community was reported by studies from Cambodia, Pakistan, India, China, Kenya and Tanzania (30-32, 40, 41). Regular outreaches to the

community were reported to be the ways to bring services closer to the patients and hence reducing patient transport and other indirect costs associated with seeking healthcare in distant health facilities. A cross-sectional study conducted in India compared regular outreaches conducted every month in the same town and the same building, with irregular outreaches held in different locations across the study district. Data was abstracted from registers to determine acceptance rates and interviews were conducted with the individuals who accepted and did not accept the surgery. The acceptance was higher in the location with regular outreaches (94.6% vs. 82.3%, $P < 0.001$). This finding is in line with the qualitative study in China (32), where frequent outreach screening was ranked highly by both hospital administrators (rank #1 [score 0.788]) and doctors (rank #2 [score 0.630]) interviewed.

- (iii) Use of trained patient counsellors on cataract and its treatment benefits to ensure adequate counselling of patients was reported by studies from Cambodia and India (36, 40). Adequate counselling was reported as a strategy that can help clear any fears and myths that would lead to decline among patients.
- (iv) Improving diagnostic skills of eye health care workers to ensure

only those with operable cataracts are referred was reported by a study conducted in Kenya and Tanzania (31). Similarly, in a qualitative study conducted in China (32), improving surgical quality was ranked high by both hospital administrators and doctors (administrator rank #3, score 0.616; doctor rank #3, score 0.478).

- (v) Reduction or elimination of the costs associated with cataract surgery was reported by a study from Pakistan (41). This study mentioned that cost reduction through subsidy and provision of transport to reduce indirect costs are some of the strategies that can improve access. On the other hand, one of the RCT consisted of a community-based randomized interventional study (28), whose interventions were categorized into three groups as follows: Group 2 - 86 participants were offered free surgery; Group 3 - 90 participants were offered reimbursement for transport expenses and free surgery; and Group 4 - 93 participants were offered free rides to and from the hospital and free surgery. The intervention groups were then compared to the control group (group 1), which was reminded to use the “low-cost” (~USD 38) cataract surgery programme at the hospital. The number of patients who underwent cataract surgery in group 2 was significantly higher than that in

group 1 ($P=0.027$). In addition, there was no significant difference in the number of participants who underwent cataract surgery between groups 2, 3, and 4. It was therefore not clear if surgical fee waiver with/without transport provision or reimbursement increased uptake of surgery (RR 1.94, 95% CI 1.14 to 3.31).

- (vi) Improving community awareness of eye health and available services through health education and other communication channels was reported by studies from Cambodia, India and Ghana (21, 23, 37, 40) as a strategy that can improve uptake. On the other hand, the other RCT also from China ($n = 434$) (24), randomly allocated 26 villages or townships to the intervention which included watching an informational video and a group education/counselling to patients and their families. The control group were diagnosed with cataract and advised to seek treatment by going for surgery without being shown the video or receiving counselling. The study findings showed that being a member of the intervention group was not a significant predictor of accepting surgery (OR=1.11, 95% CI 0.67–1.84).

Three studies reported on strategies to improve uptake of surgery by women, a case study from Pakistan (41) and two qualitative studies from Cambodia and

Zambia (33, 38). However, the impact of such strategies was not reported since all the three studies were descriptive. In the Cambodia study, addressing socio-cultural barriers and strengthening social networks were recommended as important steps in influencing women's health seeking behaviour (33).

The Zambia study (38) recommended bringing families into counselling sessions, providing transport and counteracting prevailing misconceptions about surgery (38).

The Pakistan case study (41) recommended community-based health facilities to ensure women could reach home for the evening; day case surgeries to reduce effort and indirect costs; services over the weekends when it is easy for young family members to accompany the elderly female relatives; fee subsidies; and the involvement of local primary health care workers. The authors reported that these strategies led to consistently high rates of surgery uptake among women but due to the study design, no conclusions on the attribution could be made.

Discussion

This systematic review aimed to synthesise all available evidence on strategies and influencing factors to uptake of cataract surgeries in LMICs. This review also presents evidence of reasons behind the low access of cataract surgical services among women and other sub- groups.

This systematic review builds on a Cochrane systematic review (15), which included RCTs only that looked at the interventions to improve access to

cataract surgical services and their impact on equity in low- and middle-income countries (15). Findings from this review included limited evidence on which strategies work in LMICs, and review authors emphasise the need for further well-designed research to identify interventions in improving access to cataract surgical services.

This systematic review includes not only RCTs but also all other types of evidence that addressed strategies to improve uptake of cataract surgical services in LMICs and also looked at their influencing factors, which is not addressed on the Cochrane systematic review. In addition, this review presents reasons behind the low access of cataract surgical services among women and how to overcome such obstacles.

Although most of the studies that we reviewed are of weak methodological quality, the study findings suggested that access of cataract surgery is influenced by several factors that are interconnected to each other at individual, community and health system level. A few of the included studies also mentioned strategies that could improve the uptake of cataract surgery. However, there is limited evidence on the effectiveness of these strategies thus the need for further research to establish their effectiveness.

The International Agency for the Prevention of Blindness (IAPB) recommends 85% coverage of cataract surgery in order to meet the needs and the demands of a population. However, in all the reviewed studies that reported CSU/CSC, none of them had attained this recommended target. This highlights the need to focus on the factors and

strategies that facilitate increased uptake of cataract surgery.

Regular outreach was reported to improve uptake of cataract surgery by bringing the services closer to the community, hence reducing the distance as well as transport costs that were associated with low uptake (30, 31, 40, 41). This is consistent with other studies conducted in India (23), Tanzania and Kenya (31) whose findings showed higher CSU rates in areas with regular outreaches compared to those with no outreach. This could mean that outreach was used as a mechanism to overcome the difficulties of distance, and its associated transport cost.

The review found mixed evidence around the provision of free surgery as a strategy to improve uptake of cataract surgery. Some of the included studies showed that even when free surgery was provided, the uptake of surgery did not improve to the expected level (26, 35). This could be attributed to the fact that even when cataract surgery is provided free of cost, the patient and their families still incur significant indirect costs coupled with health system inefficiencies. In consistency with other studies, indirect costs such as loss of income from work, delegating household responsibilities and transportation for both the patient and his/her attendant were reported as important factors that negatively influence cataract surgery uptake especially in households of low socio-economic status (9, 30, 42-44). This indicates that reducing or removing direct costs of surgery alone may not be effective but may potentially work in combination with other strategies.

Availability of family support, positive information given by friends, neighbours and relatives were highlighted as key factors in motivating someone to take up surgery. This is in line with other studies conducted in China (7) and India (23). Similarly, in a recent yet to be published multi-country study conducted in Kenya, Uganda and Zambia (45), family support, encouragement by neighbours and acquaintances emerged as an important facilitator to uptake cataract surgery. Family support can be complex and difficult with increasing household size and also women are more disadvantaged than men when negotiating for family support (23, 39, 46). Thus, for effective social support, comprehensive community awareness on cataract and the potential benefits of cataract surgery is needed. This should be further targeted to the household heads and family decision makers for a greater impact. Such awareness and knowledge leads to acceptance of early detection and treatment thus reducing visual impairment in the population (47).

Adequate counselling helps to prepare patients for the surgery and also clear any myths or fear hence eliminate or reduce declines of surgery (36, 40). Sufficient time is needed for a trained counsellor to explain everything to the patients in order to clear those myths, address anxieties and enable them to make informed decisions. In addition, every patient should be made aware of the benefits of the cataract surgery in their livelihoods (36). However, in LMICs, not enough time is taken to explain and give adequate information to the patients and to answer some of the questions about the surgery (36). The reason for this could be due to the larger volume of

patients per healthcare provider who then may not have sufficient time and finds it difficult to explain everything to the patient hence patient counsellors could be very useful in providing this service (36, 45). The use of successfully operated patients as champions can be a good counselling strategy to encourage and clear any prevailing fears (22, 39, 40, 46). As shown in other studies, this can be strengthened by ensuring high quality surgeries to reduce incidences of poor visual outcomes which can act as a source of discouragement to the patients (31, 32, 46).

The study findings suggest that females do not receive cataract surgery at the same rate as males and that closing the gender gap could significantly decrease the burden of cataract blindness. This could be attributed to the gender-defined social roles and differences confounded by socioeconomic factors, such as literacy, marital status, poverty and family support as well as cultural factors. The socio-cultural perspectives present men as superior to women to an extent that men's health is prioritized more than women, hence women give less priority over their own health than men (8). In addition, women who are traditionally the primary family carers don't have time to access services for their own due to their demanding household duties which also puts them in an immobile situation (23, 29, 33, 38, 39, 41). As a result, women's immobile nature makes their access to health information limited and when counselling is not adequately provided to understand the benefits, they are likely to not take up the services (33, 35, 48). Evidence in this review suggested that counselling can be more effective if it starts at the screening camp and is

provided by fellow women who have successfully gone through the surgery to encourage and support the others (36, 38).

Direct and indirect costs associated with cataract surgery, partly due to long distances to the referral hospitals and limited availability of eye care services at lower level facilities, is a drawback for women's access to services (33, 38). This, coupled with low literacy levels, limited decision-making autonomy and limited access and control over resources by women compared to men has majorly contributed to low uptake of cataract surgery among women. This is because, if a woman has to travel to a referral facility and the financial support needed to facilitate her movement is not provided or in some cases the permission is lacking, then the treatment opportunity is missed and the burden of visual impairment continues to grow in women (33, 38, 39). The low literacy levels and limited access to information compared to men could also make women prone to the myths and misconceptions about surgery, leading to fear of surgery and consequently influence their decision not to have surgery (29, 49-51). As a result, most women turn into using home remedies to treat their eye problems, others seek second opinions from traditional healers and the problem persists leading to blindness. This then could explain the reason why women bear the higher burden of blindness in developing countries compared to men.

Despite the many challenges contributing to poor access of cataract surgical services among women, this review found limited evidence on what strategies can be applied to effectively overcome the

challenges and ensure optimal access for women. The two key strategies that have been emphasized in literature (though effectiveness not measured) to improve access for women are provision of transport to the surgical facility and back; and good quality counselling. A study by Lewallen and Courtright found that, “females are significantly more likely than males to access services through programmes that provide transport from rural areas; they are less likely to come to the hospital on their own” (48). Quality counselling in addition to transport can help to establish a link between the hospital services and the community. Families with women who have been diagnosed with cataract and referred for cataract need to be counselled and informed of the benefits of the surgery. This is because women will most likely depend on either their husbands or children for support to seek health care. This combined with the use of women who have undergone the cataract surgery to encourage others through women support groups have been cited as good strategies to improve women’s access to cataract surgical services (48).

There are mixed findings on access to cataract surgery among people in lower socioeconomic groups and the associated factors. While some studies report that uptake of surgery decreases with lower socioeconomic status (23, 26, 32-34), one study presented opposing results (27) and another one showed no significant association between level of income and uptake of cataract surgery (29). However, these results may be undermined by the lack of consistent definition and socioeconomic status measurement tools. Socioeconomic status is a complex issue – social and

economic status are determined by a number of very culturally specific issues that are hard to boil down to a simple tool. Association of low cataract surgery uptake with low socioeconomic status has also been reported elsewhere; a study conducted in Malawi showed that, parents of cataract blind children who declined free cataract surgery were poorer, less educated, had a lower income and lived in less permanent homes compared to acceptors (52). Therefore, economic hardship can decrease acceptance of free cataract surgical services, meaning that just providing surgery free of cost may not be sufficient for the most economically disadvantaged populations.

Limitations and Strengths

Although review authors conducted a thorough search of the literature, this review cannot preclude the presence of publication bias, therefore sources included in this review may not be representative of all available information on this subject. This review may also be prone to language bias as it only included studies written in English, Portuguese and French, although no studies written in other languages were identified.

Overall, included studies were mainly observational studies with high risk of bias, as methods used were not clear or were not reported. In addition, included studies in this review did not report the impact of the strategies to improve uptake of cataract surgeries.

Conclusion

Based on this review, the primary conclusion is that there is a terrible lack of good quality evidence into effective interventions to improve uptake of cataract surgery. Despite clear barriers facing women, there is even less evidence to address their specific barriers and improve their access to cataract surgery. Other characteristics associated with uptake of cataract surgery need to be investigated as drivers of disadvantage and solutions sought and tested to overcome them.

Improving the uptake rate of cataract surgery in LMICs may require development and effectiveness testing of combined strategies ranging from: intensified awareness creation that targets the entire family and not just the patient; adequate counselling by a trained personnel and use of previously operated patients with good visual outcomes as peer counsellors especially for women; regular community outreaches to reduce the distance to health facilities and eliminate the associated costs of transport and period of hospital stay; as well as trained health workforce to ensure operation of only those deserving and provision of high quality surgeries.

Gender disparities in the uptake of cataract surgery still exist due to the different sociocultural roles for men and women as well as the low literacy levels among women coupled with limited decision-making autonomy and control of resources. The main factors that preclude women from taking up cataract surgery include; lack of awareness of services, lack of access to services and reluctance to accept services. If these three issues could be proactively addressed among women, cataract surgical rate/coverage may improve. We also recommend the need to identify the main decision maker within families, since the person making the ultimate decision around surgery for a woman could be the husband/partner, children or siblings. Such decision makers should be brought for counselling and informed of the potential benefits of sight restoration surgery.

The weak methodological quality of the included studies indicates limited good quality evidence of effective strategies to improve access of cataract surgery. There is therefore a need for further high-quality research to measure the impact and effectiveness of strategies with a particular focus on neglected or disadvantaged groups.

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Appendix

Table 3: Databases and search words

| Databases/websites | Search words |
|--|--|
| Embase Classic (Ovid) | <ol style="list-style-type: none"> 1. Cataract 2. Surgery OR treatment 3. 1 and 2 4. Africa 5. Asia 6. Low-income country 7. Medium-income country 8. China 9. 4 and 5 and 6 and 7 and 8 10. 3 and 9 |
| Embase: Excerpta Medica (Ovid) | |
| CENTRAL (Cochrane Controlled Register of Trials) | Cataract surgery AND developing countries OR Low and Middle-Income Countries |
| LILACS | Cataract surgery uptake AND developing countries |
| ISRCTN | Cataract surgery uptake AND developing countries |
| ICTRP | Cataract surgery uptake AND developing countries |
| Google scholar | Cataract surgery uptake AND developing countries AND facilitators |
| Medline | Cataract surgery uptake AND developing countries |

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