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Reducing inequity of cataract blindness and vision impairment is a global priority, but where is the evidence?

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SUMMARY

Throughout the world, people who are socially or economically disadvantaged disproportionately experience blindness and vision impairment caused by cataract. Reducing vision loss from cataract and its unequal distribution must be a priority if the World Health Organization's aim of 'universal eye health' is to be realised. To help achieve this, decision-makers and service planners need evidence on which strategies improve access to cataract services among disadvantaged populations, and under what circumstances. Unfortunately, despite many strategies to improve cataract services being implemented in recent decades, evidence of what works, for who, and in what circumstances is not readily available. This paper summarises the extent of the evidence on interventions to reduce inequity of vision loss from cataract, and makes suggestions for how the evidence-base can be strengthened.

MAIN TEXT

Inequity in access to cataract services

Cataract is the leading cause of blindness globally, and a major cause of moderate and severe vision impairment, affecting an estimated 65 million people in 2015.[1] Reducing cataract blindness and vision impairment is, therefore, a priority in the *Universal Eye Health: Global Action Plan 2014–2019* endorsed at the 66th World Health Assembly in 2013.[2]

Vision loss from cataract is unequally distributed throughout the world. For example, in 2015 among adults 50 years and above, the age standardized prevalence of cataract blindness ranged from 0.08% (80% uncertainty interval [UI] 0.03–0.19%) in high income countries of the Asia Pacific region to 2.35% (80% UI 0.72–5.04%) in West sub-Saharan Africa—almost a 30-fold difference.[1] Inequality (i.e., measurable differences between population subgroups) is also evident within countries, with a higher prevalence of cataract blindness among socially disadvantaged groups such as women, rural dwellers, and people who are not literate.[3] These inequalities are avoidable and unjust and are referred to as inequities.[4]

Cataract surgery is usually highly effective, with good outcomes. Inequity in cataract blindness is, therefore, primarily due to differential access to quality eye care. To reduce this inequity, the provision of good quality cataract surgery must increase among socially disadvantaged people at a faster rate than among the more advantaged. To help achieve this, decision-makers and service planners need to understand which strategies improve access to cataract services among disadvantaged populations, and under what circumstances.

Reducing inequity: what is the evidence?

Cochrane Eyes and Vision recently published a systematic review that summarises the available evidence on strategies to improve access to cataract services in low- and middle-income countries (LMICs) and their impact on inequity.[5] The purpose of the review was to explore the effectiveness of interventions that targeted disadvantaged populations, or reported the distribution of effects across population subgroups.

Exhaustive searching for publications with relevant study designs (i.e., randomised and quasi-randomised controlled trials, controlled before-and-after or interrupted time series studies) identified

only two publications. Both were cluster-randomised controlled trials conducted in rural China, and both recruited adults with vision loss from cataract. In one study the intervention was additional information and counselling about cataract and its treatment, compared with usual care.[6] The other study explored the impact of providing free cataract surgery and help with transport costs compared with low-cost cataract surgery and no support for transport.[7] The evidence was judged to be of low certainty because the effect estimates were imprecise, and because findings from rural China may not be applicable to other settings. Bearing this in mind, the findings suggest that offering more information or counselling may not improve uptake of referral or surgery, and that offering free cataract surgery may increase uptake. Neither study measured the effect of the interventions on the prevalence of vision impairment from cataract in the community, nor whether effects were equitable.[5]

Strengthening the evidence

Ideally decision-makers could draw on evidence from a range of contexts when planning services for cataract. However, despite the implementation of strategies to improve cataract services in recent decades, evidence of what works, for who, and in what circumstances is not readily available. This problem is not unique to eye health—the recognised mismatch between the large volume of research describing health inequity compared to the number of studies reporting interventions to reduce inequity[8] has partly been attributed to the evaluation of such interventions being more methodologically difficult.[9]

While only two studies met the inclusion criteria for the systematic review, the search identified additional studies describing strategies to increase uptake of cataract services which were excluded as they did not meet the strict criteria for inclusion e.g. they had insufficient data collection time-points before and after the intervention to be included as an interrupted time series study.[5] Some of these publications described promising strategies that warrant more rigorous evaluation and some suggestions for strengthening the available evidence are offered in Table 1.

Table 1: Opportunities to strengthen the evidence on reducing inequality in vision loss from cataract in low- and middle-income countries

Study component	**Key opportunities**
Population	• When planning studies, include subgroup analysis to assess equity implications of interventions across relevant PROGRESS axes* (and calculate sample sizes accordingly) • Use the Equity Tool (www.equitytool.org) or similar to assess outcomes by socioeconomic status
Intervention	• Test supply- as well as demand-side interventions (individually and in combination) • Use qualitative methods to identify scalable community-led strategies to test (e.g. local volunteer escorts; local motivators who have had successful cataract surgery; allow cataract patients to share transport with those travelling to market; establish a group of local philanthropists to cover costs; establish networks of case finders/escorts)
Comparison	• Use step-wedge designs and make comparisons over time—phase in interventions so that ultimately all participants receive the intervention by the last study step • Undertake sequential trials with embedded evaluations to iteratively refine implementation interventions[10]
Outcome	• Extend outcomes beyond uptake of service: - Plan longer-term studies (e.g. between two prevalence surveys) to assess policy-level interventions, and enable assessment of the prevalence of cataract blindness as an outcome - Include post-operative visual outcome (as a measure of intervention quality) whenever possible
Study Design	• Use quasi-experimental studies alongside experimental studies • Establish 'implementation laboratories'[10] to make head-to-head comparisons between different settings • As more primary studies become available, synthesize evidence in systematic reviews
Setting	• Undertake primary studies in more contexts • Adopt more comprehensive ways to describe context

*PROGRESS: **P**lace of residence; **R**ace/ethnicity/ culture/ language; **O**ccupation; **G**ender/sex; **R**eligion; **E**ducation; **S**ocioeconomic status; **S**ocial capital/networks.[11]

In particular, more implementation research has been called for,[9 12] which aims to understand "what, why, and how interventions work in real world settings and test approaches to improve them".[13] Quasi-experimental studies, such as difference-in-differences or interrupted time series,[14] warrant particular consideration. In these studies participants are not randomly allocated to different interventions, and outcomes are either compared between groups after a period of time to measure

the difference in differences, or change is measured within the same group over time (i.e., before and after the intervention).[15]

When testing strategies to address inequity in access to cataract surgery, quasi-experimental studies can generate knowledge on what works and what does not in 'real world' settings. Quasi-experiments do not alter the context in which data are generated, producing externally valid results, and can be used when rolling out large scale programs. As these types of studies can use routinely collected outcome data they can be faster and lower-cost than randomised controlled trials.[16]

Quasi-experimental methods could also be used within 'implementation laboratories', which have been proposed as a way to assess the design and delivery of interventions on a large scale, through collaboration between health service implementers and researchers.[10] Ideally studies on strategies to reduce inequity in vision loss from cataract would occur between two blindness prevalence surveys that disaggregate outcomes by wealth quintiles and gender, so the social distribution of cataract blindness in the target population is known at the two time points. Sequential trials of promising strategies can then be tested—such as different models of financial support, variation in the location and frequency of outreach, and community-led solutions (see Table 1)—with outcome data disaggregated by wealth quintile and gender to assess equity impacts. Embedded process evaluations of the interventions would provide knowledge on how the context, intervention design and delivery influence effectiveness.[10] If implementation laboratories were established in different settings, knowledge could be generated on how health system characteristics and cultural and socioeconomic factors modify the effects of the intervention.[10]

The evidence gap identified in the Cochrane review[5] means resources may be wasted on ineffective strategies, and opportunities are being missed to scale-up effective strategies. The *Universal Eye Health: Global Action Plan 2014–2019* calls for more evidence to be generated and emphasis is given to epidemiological studies such as cross-sectional prevalence surveys.[2] While we agree that epidemiological evidence is essential to plan and monitor services, we urge researchers and funders to also generate evidence on how best to implement services to reduce vision loss from cataract and its unequal distribution.

Researchers must overcome a number of barriers to successfully generate evidence that can be used to reduce inequity in vision loss from cataract. These barriers include weak health information

systems, a lack of routinely collected eye health data, and limited capacity to undertake and interpret implementation research at the local level. Taking a collaborative approach can help address capacity shortfalls. Indeed, one of the most important factors to promote the use of evidence are relationship- and skills-building between researchers, implementers and policy-makers.[17] An example of such a collaboration in Mozambique recently demonstrated how health information system data can be used in quasi-experiments, and shows what might be possible if similar efforts were attempted with routinely generated eye health information.[18]

To realise Universal Eye Health more and better evidence is needed. Major innovation is required, and researchers have a responsibility to learn and apply the most relevant methods to generate the required evidence, which includes quasi-experimental methods[14] and implementation research. Governmental and non-governmental eye care service providers can improve the quality of data they collect, and make it more readily available to researchers.[14] Crucially, effective collaborations between researchers and health system partners are required to produce generalisable evidence on how to reduce inequity in vision loss from cataract.

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