



# Gender Inequalities in Surgery for Bilateral Cataract among Children in Low-Income Countries

## A Systematic Review

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**Purpose:** Cataract is a common cause of avoidable blindness in children globally. Gender differences in service access among children are reported for several conditions, but not for surgery for bilateral cataract. In this review we compared the proportion of children undergoing surgery for bilateral, nontraumatic cataract who were girls, using data from high-income, gender-neutral countries as the reference.

**Design:** Systematic review.

**Methods:** A systematic review of MEDLINE was undertaken in November 2014. Studies published only from 2000 onward were included because techniques and services have improved over time. A wide range of study designs was included such as: population-based data, registers, studies of surgical techniques, clinical trials, and so forth. All articles with 20 or fewer cases were excluded or were of long-term follow-up only, because this may reflect gender differences during follow-up. A meta-analysis was not planned.

**Results:** Thirty-eight studies (6854 children) were included from 1342 titles, 10 from high-income countries. Many did not present data disaggregated by gender. Overall, 36.5% of children were girls. In gender-neutral countries, 47.5% of children (777/1636) were girls, being similar in the Middle East, North Africa, and Central Asia (48.6%; 87/179) and in Latin America and the Caribbean (43.7%; 188/430). Proportions were significantly lower in sub-Saharan Africa (41.1%; 225/547), East Asia and the Pacific (36.0%; 237/658), and South Asia (29.1%; 991/3404).

**Conclusions:** Access to surgery by girls with bilateral cataract is lower in some regions than by boys. Barriers to access specific to girls need to be identified, particularly in Asia, to assess interventions to improve uptake. *Ophthalmology* 2016;■:1–7 © 2016 by the American Academy of Ophthalmology.



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The epidemiology of blindness in children is dynamic, responding to socioeconomic development, demographic change, and coverage of public health interventions for child survival (e.g., measles immunization, vitamin A supplementation), as well as the availability of and access to eye care services.<sup>1</sup> In the mid 1990s, there were estimated to be 1.4 million children who were blind; this number was derived from prevalence estimates using mortality rates for children younger than 5 years as a proxy and the child population 0 to 15 years of age in each country. In 2005, the estimate was revised, suggesting that there had been a 10% decline in the number of blind children, to 1.26 million.<sup>2</sup> A later estimate, using mortality data for children younger than 5 years from 2008 and the child population for 2014, suggested a further decline, to 1.14 million.<sup>3</sup>

The causes of blindness in children also can change fairly rapidly over time, with a marked reduction in corneal scarring being reported over the last 2 decades in the poorest

countries, and retinopathy of prematurity emerging as the most common avoidable cause in many middle-income countries. Because the incidence of corneal scarring resulting from keratomalacia has declined, cataract is now the most common cause of avoidable blindness in children in many low-income settings.<sup>1,4</sup>

Childhood cataract may be unilateral or bilateral, congenital or developmental, and primary or secondary. Bilateral congenital or developmental cataracts may be inherited, with autosomal dominance being the most frequently reported mode of inheritance; they may also be the result of intrauterine infection, or they may be associated with syndromes. However, in a large proportion of cases the underlying cause cannot be determined.<sup>5–7</sup> No cause is likely to affect boys and girls differently, and therefore, one would expect an equal incidence by gender. Indeed, a study of all newly diagnosed children with cataract seeking treatment from health services in the United Kingdom over a

12-month period in 1995 and 1996 reported that the proportion of girls almost equalled that of boys.<sup>5</sup>

Early presentation followed by high-quality cataract surgery with long-term follow-up are factors that influence visual acuity outcomes. However, in many low-income settings, children seek treatment late, which compromises outcomes,<sup>8</sup> and in Tanzania, girls were likely to seek treatment later than boys.<sup>9</sup> In a study in Malawi, which included families of children with cataract who had or had not accessed surgery, poorer families and those living farther from facilities were less likely to have accessed services, but in this relatively small study, gender was not associated with acceptance.<sup>10</sup>

Gender differences have been reported for a wide range of health outcomes and conditions affecting children, including mortality rates for children younger than 5 years. For example, a study in almost 600 districts in India estimated that there were 74 000 more deaths among girls than boys.<sup>11</sup> In another large-scale study, gender differences in mortality rates for children younger than 5 years were compared between high-income countries that were considered gender neutral (e.g., European countries and those in North America) and 31 sub-Saharan countries in Africa and 4 countries in Asia. This study, along with many others, concluded that maternal education reduces mortality rates for children younger than 5 years and reduces gender inequality.<sup>12</sup>

The purpose of this study was to assess whether there are gender differences among children who have accessed surgery for bilateral cataract and whether there was regional variation, using data from high-income countries as defined by the World Bank,<sup>13</sup> that could be considered gender neutral as a comparator. The objective of the review was to compare the proportion of boys and girls identified by health service providers as having bilateral cataract and who had undergone cataract surgery in one or both eyes using data from studies with a range of designs, including surveillance, case series, and clinical trials of different aspects of surgery.

## Methods

The study was limited to children with bilateral cataract. Children with unilateral cataract were excluded for several reasons. First, traumatic cataract is much more frequent in boys than girls. Second, in settings where children often seek treatment very late, congenital or developmental cataract may be misclassified as traumatic and visa versa. Finally, unilateral cataracts often are not operated on in low- or middle-income settings because late presentation gives very poor outcomes on account of dense amblyopia. Studies published before 2000 also were excluded because surgical techniques and the provision of surgical services for children have improved over time.<sup>14</sup>

### Eligibility Criteria for Considering Studies for This Review

Articles in all languages and a wide range of study designs were included, that is, those reporting epidemiologic data or data from registers, surgical techniques, clinical trials, the outcome or complications of surgery, or delay in presentation for surgery. Articles were excluded if they reported fewer than 20 bilateral cases or if they

reported cases with long-term follow-up only, because this may reflect gender differences in follow-up as well as access to surgery.

### Search Methods for Identifying Studies

A systematic review of the published literature was conducted in MEDLINE (November 2014). Reference lists in published articles also were reviewed. The search terms used are shown in the [Appendix](#) and Prisma checklist (available at [www.aojournal.org](http://www.aojournal.org)).

### Study Selection

After removing duplicates, titles identified in the search were scanned by one reviewer (N. L.-C.), and the abstracts of selected titles then were reviewed. When case series reported different aspects of the same group of children, such as delay in attendance in one article and the outcome of surgery another, only 1 was retained. Articles that fulfilled the eligibility criteria were read in full, even if unilateral and bilateral cases were reported together. Attempts were made to contact authors reporting data on unilateral and bilateral cases together to request data disaggregated by gender for bilateral cases only. Some data provided by authors differed slightly from that in their publication with respect to the total number operated on and the proportion who were girls, because some reported only those attending follow-up in the denominator in the publication. The final list of articles was reviewed by both authors (N.L.-C. and C.E.G.).

### Data Collection and Risk of Bias Assessment

Data were extracted and entered into an Excel spreadsheet (Microsoft, Redmond, WA) using predetermined headings that included author, year of publication, country, study design, total number of children with bilateral cataract undergoing surgery, and the proportion who were girls. Articles that reported cases attending long-term follow-up only (i.e., that did not present data on the entire cohort undergoing surgery) were excluded as gender differences in follow-up rates would have biased the findings.

Data were prepared for countries classified as high income by the World Bank, and other countries were classified under each of the 6 World Bank geographical regions. The proportion of children accessing cataract surgery who were girls was compared by region using the Z statistic; data from countries defined by the World Bank as high income were used as the reference.

### Data Synthesis and Analysis

A meta-analysis was not planned because of the heterogeneous nature of the study designs. Findings are reported narratively. Ethical approval was not required for this study.

## Results

The search generated 1342 titles, and 38 studies were included in the review ([Fig 1](#)). A total of 6854 children were included in these studies, 2505 (36.5%) of whom were girls. Ten studies from high-income countries were identified, 2 each from the United States, the Republic of Korea, and the United Kingdom, and 1 each from Australia, Italy, Denmark, and Sweden ([Table 1](#)).

The United Kingdom study reports on children identified with cataract through a national surveillance study who subsequently underwent surgery, 46.7% of whom were girls<sup>19</sup>; this is very similar to another study from the United Kingdom reported in 2015.<sup>20</sup> Data from the initial surveillance study identified 248 children with congenital or developmental cataract (i.e., excluding traumatic cataract) who sought treatment from ophthalmologists across the

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