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# Preoperative visual acuity among cataract surgery patients and countries' state of development: a global study

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**Objective** To describe the preoperative surgical case mix among patients undergoing cataract extraction and explore associations between case mix, country level of development (as measured by the Human Development Index, HDI) and cataract surgery rates (CSRs).

**Methods** Ophthalmologists in 50 countries were invited to join the newly-established International Eye Research Network and asked to complete a web-based questionnaire about their eye hospitals. Those who complied received a data collection form for recording demographic and clinical data on 100 consecutive patients about to undergo cataract surgery. Countries were ranked into five HDI categories and multivariable regression was used to explore associations.

**Findings** Ophthalmologists at 112 eye hospitals (54% of them nongovernmental) in 50 countries provided data on 11 048 cataract procedures over 9 months in 2008. Patients whose visual acuity (VA) before surgery was <6/60 in the better eye comprised 47% of the total case mix in poorly developed countries and 1% in developed countries ( $P < 0.001$ ). Overall, 72% of the eyes undergoing surgery had a VA <6/60. Very low VA before cataract surgery was strongly associated with poor development at the country level and inversely associated with national CSR.

**Conclusion** The proportion of patients with very poor preoperative VA is a simple indicator that can be easily measured periodically to monitor progress in ophthalmological services. Additionally, the internet can be an effective tool for developing and supporting an ophthalmological research network capable of providing a global snapshot of service activity, particularly in developing countries.

Abstracts in **عربي**, **中文**, **Français**, **Русский** and **Español** at the end of each article.

## Introduction

Blindness is both a cause and an outcome of poverty.<sup>1</sup> Cataract, defined by the World Health Organization (WHO) as a visual acuity (VA) of less than 3/60 in the better eye, is the leading cause of blindness in the world. It affects approximately 18 million people, 90% of them in low- and middle-income countries.<sup>2</sup> A recent study in three countries has demonstrated that successful cataract surgery in previously blind individuals can improve a household's economic status. This suggests that cataract surgery should be an integral part of strategies designed to reduce poverty.<sup>3</sup>

Thanks to improvements in surgical techniques for cataract extraction (e.g. sutureless microsurgery and use of intraocular lenses with a wide range of powers), surgery can be performed as an outpatient procedure under local anaesthesia and can restore normal VA almost immediately. It can also be offered much earlier, so that blindness can be prevented even in developing countries, where these techniques are now the norm. Clearly cataract surgery is practised under very different circumstances in different parts of the world and although its cost varies enormously, it is one of the most cost-effective of all health interventions.<sup>4</sup> Thus, cataract surgery is a priority for VISION2020: the Right to Sight initiative (<http://www.vision2020.org>), a partnership between the World Health Organization (WHO) and other agencies working in eye care, including the International Agency for the Prevention of Blindness (IAPB).<sup>5,6</sup>

Over the last two decades, increased demand has led to a marked increase in the number of cataract operations in most countries, and surgery is being performed earlier on average be-

cause patients' needs and the results that they expect to obtain from surgery have changed. From a public health standpoint, this change in the indications for surgery dramatically affects the number of people eligible for surgery. In Australia, for example, reducing the visual impairment threshold from 6/60 to 6/12 would increase the number of people eligible for surgery by nearly fivefold.<sup>7</sup> Concerns have been raised that in some high-income countries too many cataract operations are being performed,<sup>8</sup> often to correct refractive error rather than to reverse visual impairment.

The cataract surgery rate (CSR), which represents the number of cataract extractions performed per million population per year in a given location, is a key indicator for monitoring eye care services. To reduce visual impairment from cataract the CSR must be greater than the incidence rate of cataract.<sup>9</sup>

According to WHO, whose estimates of country-level CSR are the best available,<sup>10</sup> in 2004 (the most recent published data) high-income countries had a CSR ranging from 4000 to 6000, whereas in most of Africa, China and the poorer countries of Asia the CSR was often less than 500. CSR has increased substantially since then, but to understand what currently constitutes an operable cataract it is best to examine the local surgical case mix (i.e. the range of patients' visual acuities before cataract surgery and the number of first-eye surgeries performed).

This is the first study undertaken by a newly formed research network of ophthalmologists whose members were asked to collect information about the cataract surgery case mix in their hospitals. The purpose of the study was to assess variations in case mix by place and demographic characteristics, and to describe

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the relationship between preoperative VA, country development level and national CSRs.

## Methods

The International Eye Research Network (IERN), whose members are listed in Appendix A (available at: <http://www.iceh.org.uk/download/attachments/15827118/iern-participants.pdf>), is a newly established international collaboration of ophthalmologists. Recruitment was as follows: First, alumni of the Masters in Community Eye Health programme at the London School of Hygiene & Tropical Medicine (LSHTM) were approached by e-mail. Second, regional representatives of the IAPB, directors of international nongovernmental organizations involved in eye care and staff at the International Centre for Eye Health were asked for contacts. Third, an advertisement was placed in the *Community Eye Health Journal* (<http://www.cehjournal.org>) a quarterly publication that circulates among more than 34 000 eye care specialists in at least 180 countries.

Potential network members were sent an invitation to participate in the study, along with information on the study's aims and objectives. Interested respondents were sent a more detailed study protocol and a link to the web site for membership registration. Using a web-based questionnaire, network members then recorded the following information about the hospitals where they worked: type of hospital (government, private, other, etc.); volume of outpatient practice and cataract surgery in 2008; number of cataract surgeons; and status of the hospital as a provider of ophthalmology training. Information on the availability of ophthalmic ultrasound (used to assess the intraocular lens power needed) and on facilities for paediatric and vitreoretinal surgery was also collected to assess the level of specialization of each hospital, since equipment of this type is usually only available in highly specialized eye care units.

Members with complete online registration were e-mailed a questionnaire with which to record information on the next 100 consecutive patients undergoing cataract surgery in their hospital. Supporting documents describing how to collect and enter the data were also supplied. Individuals were also asked to provide data on age, sex, literacy and patients' preoperative VA, as well as on the date when each cata-

ract extraction was performed. Anyone who could read, understand and sign the surgical consent form was deemed literate. All patient information was provided anonymously, without collecting any identifiers, and study documents were available in Chinese and Spanish. Members returned completed questionnaires either electronically or by regular mail.

## Ethical approval

The study adhered to the tenets of the Declaration of Helsinki and was approved by the Ethics Committee of the LSHTM. IERN members were requested to obtain ethical approval from their institutions before collecting any patient information, and they had to indicate that this had been done. Patients gave verbal or written consent for cataract surgery as required by each hospital's policy.

## Data management and statistical analysis

Hospital and patient data were entered into Microsoft Excel (Microsoft, Redmond, United States of America) by a designated data officer at the International Centre for Eye Health. Hospital information and individual patient data were merged for analysis. Random cross-checking of 10% of the entries yielded an error rate of less than 1%.

The VA of each patient in the better eye determined their placement into one of the following categories: blindness or severe visual impairment if VA < 6/60 (very poor visual acuity); moderate visual impairment if VA ≥ 6/60 but < 6/18; nearly normal vision if VA ≥ 6/18 but < 6/12; and normal vision if VA ≥ 6/12.<sup>11</sup> Hospital surgical output, expressed as the number of surgeries per year, was categorized as low (< 1000), medium (1000–2999) or high (≥ 3000). A hospital specialization score was calculated as the sum of four binary values (i.e. yes = 1; no = 0) that comprised training, vitreoretinal services, paediatric services and B-scan ultrasonography. Hospitals were then categorized into five levels of specialization ranging from 0 to 4. The United Nations Human Development Index (HDI), a composite index that measures average achievement in health, education and standard of living, was used to assess each country's socioeconomic development. The following categories of development were used: very high (HDI > 0.9), middle-high (> 0.6 but ≤ 0.9), middle-low (≥ 0.5 but ≤ 0.6) and low

(< 0.5).<sup>12</sup> Country-specific CSR data for 2004 were obtained from WHO.<sup>10</sup>

Data were imported into STATA 10.0 (StataCorp LP, College Station, USA) for analysis. Data were summarized at the eye, individual (person), hospital and WHO region levels and by HDI. Associations at the hospital level were assessed using the  $\chi^2$  test. Estimates of effect size at the individual level were determined using logistic regression models that accounted for the clustered nature of the data (at the eye hospital) using the *svy* command in STATA. The multivariable model was built following a manual forward stepwise method with a cut-off point at  $P > 0.2$ .

## Results

### Hospital data

Hospital and patient data were provided by 112 eye hospitals from 100 cities and towns in 50 countries from all six WHO regions. The African Region comprised the largest number of countries (19), followed by the Region of the Americas and the European Region (8 each). Nigeria provided the most data (from 15 hospitals), followed by Pakistan (14 hospitals) and India (11 hospitals).

The following sectors participated: non-government, 54%; government, 38%; and other (e.g. public-private partnerships), 7.3%. In 2008 a median of 1700 cataract procedures were performed per hospital (interquartile range, IQR: 800–4000). Each eye hospital had a median of 2 surgeons (IQR: 3–8) and over one third of all surgeons (38%) had performed more than 750 cataract procedures in 2008.

Approximately one third of the units (34%) admitted all patients overnight after cataract surgery, especially in less developed countries (odds ratio, OR: 2.5 per one-level decrease in HDI ranking; 95% confidence interval, CI: 1.3–4.9). Hospital facilities varied in terms of level of specialization: 60% had a working B-scan ultrasound machine; 40% provided vitreoretinal services; 67% offered paediatric services, and 64% provided ophthalmology training. Lower hospital specialization scores were associated with lower country development: no hospitals in highly developed countries had a very low specialization score compared with 21% of hospitals in poorly-developed countries ( $P < 0.001$ ). Although hospital specialization score was also positively correlated with the number of cataract

Table 1. Demographic distribution of patients undergoing cataract surgery in 112 eye hospitals in 50 countries, by individual preoperative visual acuity (VA)

Variable	VA									
	BL/SVI <sup>a</sup>		MVI <sup>b</sup>		NNV <sup>c</sup>		NV <sup>d</sup>		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
<b>Gender</b>										
Male	1515	28	1655	31	1139	21	1015	19	5324	100
Female	1612	29	1713	31	1246	23	907	17	5478	100
<b>Age (years)</b>										
< 50	277	23	258	21	229	19	441	37	1205	100
50–59	438	26	505	30	365	22	354	21	1662	100
60–69	1061	29	1203	33	814	22	563	15	3641	100
70+	1351	31	1402	33	977	23	564	13	4294	100
<b>Literacy</b>										
Yes	773	15	1486	30	1357	27	1414	28	5030	100
No	2354	41	1882	33	1028	18	508	9	5772	100
<b>First eye surgery</b>	334	12	747	28	836	31	765	29	2682	100
No										
Yes	2793	34	2621	32	1549	19	1157	14	8120	100
<b>Surgical output<sup>e</sup></b>										
< 1 000	1060	35	885	30	602	20	440	15	2987	100
1000–2999	1026	29	927	26	801	23	788	22	3542	100
≥ 3 000	1041	24	1556	36	982	23	694	16	4273	100
<b>Hospital specialization<sup>f</sup></b>										
0 (very low)	634	38	432	26	290	18	294	18	1650	100
1	713	35	620	30	430	21	292	14	2055	100
2	466	34	426	31	262	19	211	15	1365	100
3	571	26	695	32	574	26	365	17	2205	100
4 (very high)	701	21	1129	34	777	23	730	22	3337	100
<b>Total</b>	<b>3127</b>	<b>29</b>	<b>3368</b>	<b>31</b>	<b>2385</b>	<b>22</b>	<b>1922</b>	<b>18</b>	<b>10 802<sup>g</sup></b>	<b>100</b>

BL/SVI, blindness or severe visual impairment; MVI, moderate visual impairment; NNV, nearly normal vision; NV, normal vision.

<sup>a</sup> VA < 6/60.

<sup>b</sup> VA ≥ 6/60 but < 6/18.

<sup>c</sup> VA ≥ 6/18 but < 6/12.

<sup>d</sup> VA ≥ 6/12.

<sup>e</sup> Number of cataract surgeries per year.

<sup>f</sup> Data insufficient to calculate hospital specialization score in a further 190 individuals.

<sup>g</sup> Full covariate data available on 10 802 individuals.

surgeries performed (73% of highly specialized hospitals performed > 3000 surgeries per year compared with 18% hospitals with low specialization [ $P < 0.001$ ]), 19% of hospitals that performed > 3000 cataract procedures a year did not have a functioning B-scan ultrasound machine.

### Patient data

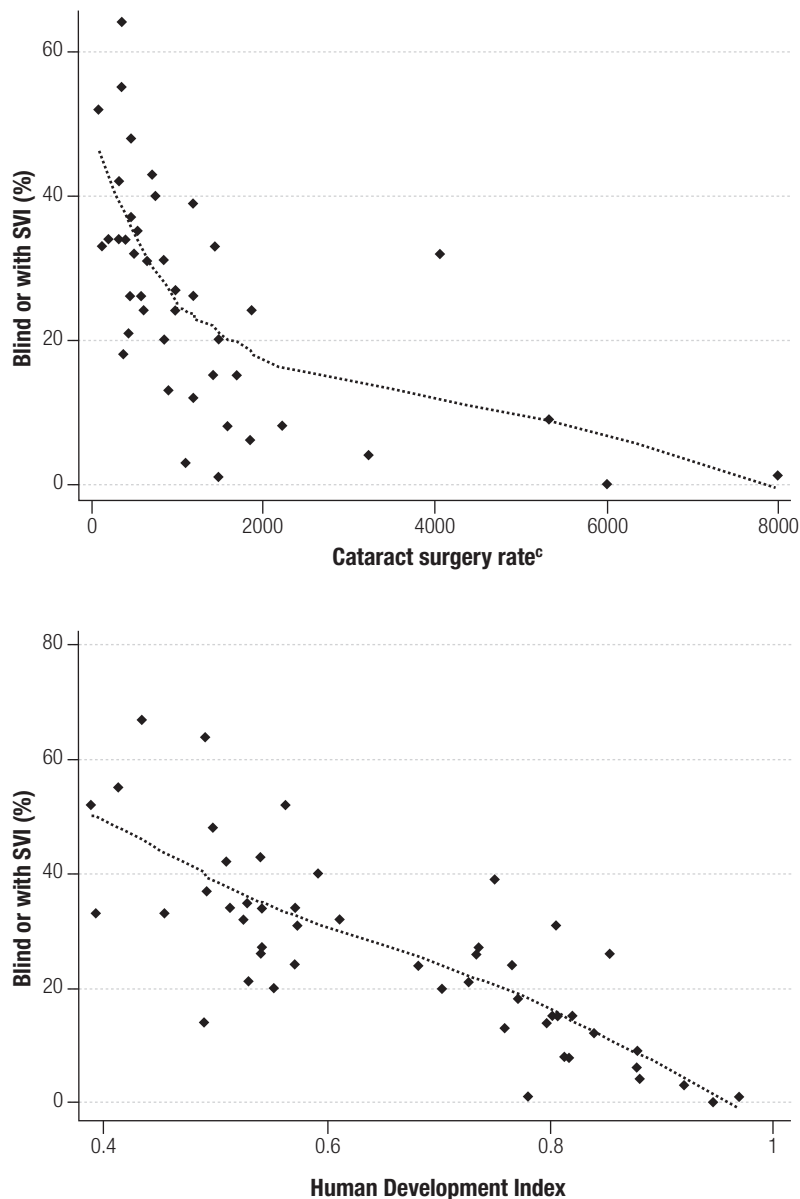
We recruited into the study 11 048 patients who underwent cataract extraction in 2008. Complete covariate data was available for 10 802 (98%) of these patients. No significant demographic differences were found between individuals with and without missing data. Nearly two thirds (61%) of the data originated from countries in middle-low or low state of development. Patients had a median age

of 65 years (IQR: 58–73). Over one third (37%) of them were less than 50 years of age (Table 1). The oldest patients lived in the European Region (median age: 72 years), whereas the youngest lived in the Eastern Mediterranean Region (median age: 60 years). More women than men underwent cataract surgery everywhere except in the regions of South-East Asia (48.5%) and the Eastern Mediterranean (47%). The largest sex difference was observed in the European Region, where 57% of patients were women. Almost half of all patients (46.4%) were literate, but literacy ranged from 29% in the Eastern Mediterranean Region to 83% in the European Region. Male patients were more literate than females on average (53% versus 40% literacy, respectively;

$P < 0.001$ ). The largest sex difference was noted in the Eastern Mediterranean Region (40% males versus 17% females).

Overall, 3127 (29%) patients were blind or had severe visual impairment before surgery (Table 1). Preoperative VA varied depending on the availability of functioning equipment and the hospital's level of specialization. In hospitals without a B-scan ultrasound machine, 36% of patients were blind or had severe visual impairment before surgery, compared with 24% in hospitals that did have a B-scan machine in working order ( $P < 0.001$ ). Hospitals that were not highly specialized were significantly more likely to conduct surgery on eyes with more severe visual impairment (Table 1,  $P < 0.001$ ).

Fig. 1. Scatterplot of percentage of patients with blindness or severe visual impairment (SVI)<sup>a</sup> against cataract surgery rate (CSR) and Human Development Index<sup>b</sup> (HDI), for all 50 countries involved in study



<sup>a</sup> Visual acuity < 6/60 in the better eye.

<sup>b</sup> Increasing HDI indicates higher country development (curve determined by a locally-weighted regression [Lowess]).

<sup>c</sup> Number of cataract extractions per million population per year.

Note: The outlier with a CSR of 4067 is India.

As shown in both parts of Fig. 1, a nonlinear inverse relationship between preoperative VA and CSR was observed, along with a linear inverse relationship between preoperative VA and HDI (Pearson's  $r = 0.79$ ;  $t = 8.8$ ;  $P < 0.0001$ ). In countries with a low HDI, nearly half (47%) of the patients were blind or had severe visual impairment at the time they underwent cataract surgery; in countries ranked as having middle-low and middle-high development, such patients were only 32% and 23%, respectively, and in

very highly developed countries, they were only 1% (Table 2). This association remained highly significant in the multivariable analysis (Table 3). Illiterate patients had almost three times the odds of having very poor preoperative VA as literate patients (Table 3). Older patients also had higher odds of having very poor preoperative VA than younger patients ( $P < 0.001$ ).

Three quarters of the patients in the study received surgery to their first eye and most eyes (75%) had a VA of < 6/60.

The proportion of patients who underwent surgery in the first eye decreased as country HDI increased (81% in countries with a low HDI compared with 66% in those with a very high HDI;  $P < 0.001$ ). Illiterate patients were significantly more likely to undergo surgery in the first eye (OR: 1.4; 95% CI: 1.17–1.65;  $P < 0.001$ ). The more specialized the hospital, the less likely it was to be operating on first eyes (OR: 0.72 per category increase; 95% CI: 0.55–0.93;  $P = 0.015$ ). No difference in sex ( $P = 0.93$ ) was found. Of the patients who underwent surgery to their second eye, 10% were blind or had severe visual impairment in both eyes preoperatively.

Overall, 72% of the eyes undergoing surgery were blind or had severe visual impairment. This proportion varied in accordance with a country's HDI (15% for countries with a very high HDI; 62% for those with a middle-high HDI; 80% for those with a middle-low HDI, and 90% for those with a low HDI;  $P < 0.001$ ). In Australia, 75% of the eyes had a preoperative VA level of 6/12 (the VA cut-off used in many countries to determine eligibility for driving), whereas in Malawi this figure was 7%. No differences were observed by sex (75.3% of men versus 74.9% of women;  $P = 0.79$ ).

## Discussion

The current study provides a snapshot of the visual acuity thresholds at which patients are undergoing cataract surgery throughout the world. It detected a clear association between better preoperative VA and higher HDI score. In countries with a high HDI the visual acuity threshold for cataract surgery has changed over time. For example, in the United Kingdom of Great Britain and Northern Ireland, 15% of cataract patients who underwent surgery had a preoperative VA of < 6/60 in 1997, but this fraction had declined to 1.6% by 2000 and to 0% in the current study. This decrease paralleled a dramatic increase in the CSR over the same period.<sup>13</sup> Highly developed countries have very little cataract-related blindness despite an aging population, which suggests that the volume of surgery is at least equal to, if not greater than, the incidence of visual loss from cataract. On the other hand, inadequate provision of cataract surgical services is likely to be reflected in a greater proportion of people with very poor preoperative VA. Indeed, countries with low CSRs tended to have higher levels of poor preoperative VA. It

Table 2. Number and proportion of patients with preoperative blindness or severe visual impairment,<sup>a</sup> by region of the World Health Organization (WHO) and Human Development Index (HDI)

WHO region	HDI									
	Low		Middle-low		Middle-high		Very high		All	
	Total	<6/60 (%)	Total	<6/60 (%)	Total	<6/60 (%)	Total	<6/60 (%)	Total	<6/60 (%)
Africa	1272	47	2617	37	200	24	–	–	4089	39
Americas	–	–	–	–	886	17	–	–	886	17
Eastern Mediterranean	–	–	1500	24	200	14	–	–	1700	23
European	–	–	–	–	700	19	200	0	900	15
South-East Asia	–	–	1073	26	1200	32	–	–	2273	29
Western Pacific	–	–	300	42	700	21	200	2	1200	23
<b>Total</b>	<b>1272</b>	<b>47</b>	<b>5490</b>	<b>32</b>	<b>3886</b>	<b>23</b>	<b>400</b>	<b>1</b>	<b>11 048<sup>b</sup></b>	<b>29</b>

<sup>a</sup> Visual acuity <6/60 in the better eye.

<sup>b</sup> Visual acuity data available for 11048 individuals.

follows, therefore, that the proportion of people who undergo cataract surgery with a very poor preoperative VA can serve as a simple measure that can easily be obtained periodically to monitor progress towards the elimination of cataract-related blindness.

The annual number of cataract operations performed globally has increased from approximately 5 million in 1988 to around 15 million in 2008.<sup>2</sup> Ideally any patient who has symptoms of cataract should be offered surgery, but service providers in low-income settings inevitably have to carefully manage their limited resources. In keeping with the

objectives of VISION2020, people who are blind from unoperated cataract stand to benefit the most from surgery and should, therefore, be prioritized. However, many other patient-related factors – age, co-morbidity, occupation, social support, mental state, etc. – must also be considered when recommending surgery. In the United States, the method of surgeon remuneration has been shown to influence surgery rates.<sup>14</sup> We found that in countries with a low HDI, most surgeries were performed on people who were not blind or having severe visual impairment, even in non-specialized hospitals. By contrast, one decade ago most people in

India and Kenya had a VA <3/60 before undergoing cataract surgery.<sup>15,16</sup> It may be that the relatively recent and dramatic increase in the number of cataract operations reported in India has not yet had an impact on the number of people who are blind from cataract (still estimated at 7.75 million).<sup>17</sup> This may explain India's position as an outlier in Fig. 1.

Our study also found that people who are blind from cataract and who present for surgery are more likely to be illiterate. Improving literacy, a specific objective under the second Millennium Development Goal, should therefore contribute to reducing the barriers to the

Table 3. Risk factors associated with blindness or severe visual impairment<sup>a</sup> before cataract surgery

Characteristic	OR	95% CI	OR	95% CI
<b>Gender</b>				
Male	1.00	–	Dropped <sup>b</sup>	–
Female	1.05	0.95–1.16	–	–
<b>Age (years)</b>				
<50	1.00	–	1.00	–
Per decade increase	1.15	1.07–1.23	1.19	1.11–1.27
<b>Literacy</b>				
Yes	1.00	–	1.00	–
No	3.86	3.52–4.23	2.96	2.39–3.67
<b>First eye</b>				
No	1.00	–	1.00	–
Yes	3.69	2.98–4.55	3.63	2.97–4.44
<b>Specialization</b>				
Low	1.00	–	1.00	–
Per category increase	0.81	0.74–0.88	0.90	0.83–0.97
<b>HDI</b>				
High	1.00	–	1.00	–
Per category decrease	1.95	1.59–2.37	1.49	1.21–1.84

CI, confidence interval; HDI, Human Development Index; OR, odds ratio.

<sup>a</sup> Visual acuity <6/60 in the better eye.

<sup>b</sup> Dropped from the multivariable analysis because of lack of significance.

uptake of cataract surgery. The fact that in two WHO regions (South-East Asia and the Eastern Mediterranean) more men than women had surgery reflects gender-based biases that are well known to exist. Women bear approximately two thirds of the burden of blindness in the world.<sup>18</sup> Hence, access to care will be equal for women and men only when women comprise 60–70% of the individuals undergoing cataract surgery.<sup>18,19</sup>

In this study 10% of people who had surgery in their second eye were blind or had severe visual impairment in both eyes. This proportion, which resembles the proportion that existed in India over a decade ago,<sup>20</sup> suggests that the surgery to the first eye failed to restore vision, either because the patient had co-morbidity or surgical complications. To avoid patient dissatisfaction, the care provider should clearly discuss visual prognosis with the patient. Efforts to improve surgical outcomes should be based on honest auditing of surgical complications, which should be prioritized as highly as improving the volume of surgery. We found that hospitals with low specialization scores were significantly more likely to operate on patients having worse preoperative vision, perhaps because hospitals with less equipment tend to be located in more remote areas and serve marginalized, poor populations. Surgery on dense cataracts is more complex and prone to complications and

results in poorer postoperative results. In addition, hospitals that lack specialized equipment, such as B-ultrasound for biometry, tend to obtain less satisfactory postoperative results, and this may influence a surgeon's decision to operate. For these reasons, hospitals that are poorly specialized should be prioritized when allocating new resources, especially if they perform high-volume surgery.

The internet has been used in ophthalmology as a tool for reporting adverse events.<sup>21</sup> However, to our knowledge this is the first study in which the focus has been primarily on ophthalmic surgery in less developed countries. With the internet now readily accessible in these settings, it can be used to develop and support a research network in a cost-effective manner.

We imposed no exclusion criteria and all hospitals volunteered to take part in this study. Thus, the data may not be representative of all eye care providers nationally or internationally and may be subject to selection bias. For example, eye units in government facilities and in the private sector may have been under-represented, and patients accessing these services probably differ from those accessing providers in nongovernmental organizations. Whether any hospitals enforced a VA threshold criterion for surgery was not investigated, but informal feedback from IERN members suggests that they

did not. In addition, all data were self-reported and no validation studies were performed. We assessed literacy through a simple method easily applicable in all centres. Although the HDI is widely used to measure a country's level of development, its accuracy has been questioned because of wide within-country variation in the indicators used. Similarly, we could not address within-country variations in the CSR because WHO only provides data at the national level. The findings of our study may therefore be subject to an ecological inference fallacy and need to be interpreted with caution.

Individual results were provided to each participating hospital. Subsequent feedback from the IERN suggests that the information proved useful for planning surgical resources at the local level. In summary, the findings of this study suggest that the proportion of preoperative patients who are blind or have severe visual impairment before cataract surgery could be a very simple indicator, easy to measure periodically, for monitoring local progress towards the elimination of visual impairment from cataract. ■

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## ملخص

### حدة الإبصار السابقة للجراحة بين مرضى الكاتاراكت المعالجين جراحياً ومستوى التنمية في البلدان: دراسة عالمية

للكاتاراكت طوال 9 شهور في عام 2008. شكل المرضى الذين كانت حدة البصر لديهم قبل الجراحة أقل من 60/6 في العين الأفضل 47% من إجمالي مزيج الحالات في البلدان النامية و 1% من البلدان المتطورة (قوة الاحتمال P أقل من 0.001). وكانت حدة الإبصار إجمالاً في 72% من العيون التي ستجري جراحات أقل من 60/6. وارتبط الضعف الشديد في حدة الإبصار قبل جراحة الكاتاراكت ارتباطاً قوياً بتدني مستوى التنمية في البلد، بينما ارتبط ارتباطاً عكسياً بمعدلات جراحة الكاتاراكت.

الاستنتاج تُعد نسبة المرضى المصابين بضعف شديد في حدة الإبصار قبل الجراحة مؤشراً بسيطاً يمكن قياسه دورياً بسهولة لرصد التقدم المحرز في خدمات طب العيون. بالإضافة إلى ذلك، يمكن أن تكون الإنترنت أداة فعّالة لتطوير ودعم شبكة بحوث طب العيون حتى تكون قادرة على تقديم لمحة عالمية سريعة حول أنشطة الخدمات، ولاسيما في البلدان النامية.

الغرض وصف مزيج الحالة الجراحية السابقة للجراحة بين المرضى الذين سيجرون جراحة اقتلاع الكاتاراكت، واستكشاف العلاقات بين مزيج الحالة ومستوى التنمية في البلد (قياساً بمنسب التنمية البشرية) ومعدلات جراحة الكاتاراكت.

الطريقة دعي 50 طبيباً مختصاً في طب العيون للمشاركة في الشبكة الدولية لبحوث العيون، والتي تم تأسيسها مؤخراً، وطلب منهم استيفاء استبيان على الإنترنت حول مستشفيات العيون التي يعملون فيها. وتلقى الذين امتثلوا لذلك نموذجاً لجمع المعطيات لتسجيل المعطيات الديموغرافية والإكلينيكية لـ 100 مريض متتال سيجرون جراحة الكاتاراكت. وتم ترتيب البلدان في خمس مجموعات حسب منسب التنمية البشرية، وأجري تحوّل متعدد المتغيرات لاستكشاف الارتباطات.

النتائج قدم أطباء العيون العاملون في 112 مستشفى للعيون (54% منها مستشفيات غير حكومية) في 50 بلداً معطيات حول 11048 إجراء علاجياً

**摘要****白内障手术病人术前视力和国家发展状况：一项全球性研究**

**目的** 旨在描述接受白内障摘除术的患者术前手术病例组合并探索病例组合、国家发展水平（根据人类发展指数[HDI]衡量）和白内障手术率的关系（CSRs）。

**方法** 50个国家的眼科医师应邀参加新成立的国际眼科研究网络，并要求完成一份基于网络的关于其眼科医院的问卷调查。这些接受邀请的眼科医师均收到一份数据收集表，用于记录连续100位即将接受白内障手术患者的人口统计学资料和临床资料。参与国按照5个人类发展指数类别排名，并运用多元回归方法探讨指数之间的关联。

**结果** 50个国家112家眼科医院（其中54%为民营医院）的眼科医师提供了2008年9个月中11048例白内障手术的资

料。不发达国家中，手术前较好眼睛的视力低于6/60的患者占总病例组合的47%，而在发达国家中此比例仅为1%（ $P < 0.001$ ）。总的来说，72%接受手术的眼睛视力低于6/60。白内障手术前视力极低与国家发展水平低下显著相关，而与国家白内障手术率呈负相关。

**结论** 术前视力极低的患者比例是一个很容易定期衡量的指标，可通过该指标监测眼科服务进展。此外，互联网也可作为发展和支持眼科研究网络的有效工具，该研究网络能在全球范围内提供服务活动的简略信息，特别是在发展中国家。

**Résumé****Acuité visuelle pré-opératoire des patients subissant une opération de la cataracte et état de développement des pays : une étude mondiale**

**Objectif** Décrire l'éventail des cas chirurgicaux pré-opératoires des patients subissant une opération de la cataracte et analyser les associations qui existent entre l'éventail des cas traités, le niveau de développement des pays (mesuré par l'indice du développement humain - IDH) et le taux d'opération de la cataracte (TOC).

**Méthodes** Les ophtalmologues de 50 pays ont été invités à rejoindre le tout nouveau Réseau international de Recherche ophtalmologique (International Eye Research Network) et à compléter, sur Internet, un questionnaire relatif à leurs services hospitaliers d'ophtalmologie. Ceux qui ont accepté ont reçu un formulaire de collecte de données permettant de recueillir les données cliniques et démographiques de 100 patients consécutifs sur le point de subir une opération de la cataracte. Les pays ont été classés en cinq catégories IDH et on a utilisé une régression multivariable pour analyser les associations.

**Résultats** Les ophtalmologues de 112 services d'ophtalmologie (dont 54% sont non gouvernementaux) de 50 pays ont fourni des données sur

11048 interventions de la cataracte sur 9 mois en 2008. Les patients dont l'acuité visuelle (AV) avant l'intervention était inférieure à 6/60 pour le meilleur œil représentaient 47% de l'éventail des cas traités dans les pays peu développés et 1% de ceux des pays développés ( $P < 0,001$ ). Dans l'ensemble, 72% des yeux subissant l'intervention présentaient une AV inférieure à 6/60. Une très faible acuité visuelle avant l'opération de la cataracte a été fortement associée à un développement faible au niveau du pays et inversement associée au TOC national.

**Conclusion** La proportion des patients présentant une très faible AV pré-opératoire est un indicateur simple qu'il est possible de mesurer périodiquement pour contrôler les progrès réalisés par les services d'ophtalmologie. De plus, Internet peut être un outil efficace dans le de développement et la prise en charge d'un réseau de recherche ophtalmologique capable de fournir un instantané mondial de l'activité des services, en particulier dans les pays en voie de développement.

**Резюме****Острота зрения до операции у больных, которым назначено хирургическое вмешательство по поводу катаракты, и уровень развития стран: глобальное исследование**

**Цель** Описать в предоперационном периоде контингент больных, перенесших операцию по удалению катаракты, и исследовать корреляции между контингентом больных, уровнем развития страны (измеряемым индексом развития человеческого потенциала [ИРЧП]) и числом операций по удалению катаракты (ЧОУК) на 1 млн человек населения в год.

**Методы** Офтальмологам из 50 стран было направлено приглашение вступить во вновь созданную Международную сеть офтальмологических исследований. Их также просили заполнить размещенную в Интернете анкету и сообщить данные о глазных больницах, в которых они работают. Те, кто заполнил анкету, получили форму для сбора демографических и клинических данных о 100 последовательно поступивших больных, которым была назначена хирургическая операция по поводу катаракты.

Страны были разделены на пять категорий по уровню ИРЧП, а для исследований корреляций использовалась многомерная регрессия.

**Результаты** Офтальмологи из 112 глазных больниц (из которых 54% были негосударственными) в 50 странах предоставили данные о 11048 процедурах по поводу катаракты за девять месяцев 2008 года. Больные, у которых острота зрения (ОЗ) лучшего глаза до операции была ниже 6/60, составляли в слаборазвитых странах 47% общей численности контингента, а в развитых странах – 1% ( $P < 0,001$ ). В сумме 72% глаз, на которых были проведены операции, имели ОЗ ниже 6/60. Очень низкая ОЗ до операции по поводу катаракты сильно коррелировала с низким уровнем развития страны и была обратно пропорциональна ее показателю ЧОУК.



**Вывод** Доля больных с очень низкой ОЗ до операции является несложным показателем, который без труда можно периодически определять, чтобы отслеживать прогресс офтальмологических услуг. Кроме того, эффективным инструментом развертывания и поддержки сети

офтальмологических исследований, позволяющим делать «моментальные снимки» результатов услуг в общемировом масштабе, особенно в развивающихся странах, может служить Интернет.

## Resumen

### Agudeza visual preoperatoria en los pacientes sometidos a cirugía de cataratas y estado de desarrollo de los países: un estudio global

**Objetivo** Describir la variedad de casos quirúrgicos preoperatorios en pacientes sometidos a extracción de cataratas y examinar las asociaciones existentes entre la variedad de casos, el nivel de desarrollo del país (de conformidad con la medición del Índice de desarrollo humano [IDH]) y las tasas de cirugía de catarata (TCC).

**Métodos** Se invitó a oftalmólogos de 50 países a que se unieran a la recién creada Red Internacional de Investigación Ocular y se les solicitó que completaran un cuestionario basado en web sobre sus hospitales oftalmológicos. Aquellos profesionales que cumplieron lo solicitado recibieron un formulario de recopilación de datos para el registro de datos demográficos y clínicos de 100 pacientes consecutivos que se iban a someter a una cirugía de cataratas. Se clasificó a los países en cinco categorías de IDH y se utilizó una regresión multivariable para evaluar las asociaciones.

**Resultados** En el año 2008, oftalmólogos de 112 hospitales oftalmológicos (el 54% de ellos no gubernamentales) de 50 países proporcionaron datos

sobre 11.048 cirugías de catarata durante 9 meses. Los pacientes cuya agudeza visual (AV) antes de la intervención era < 6/60 en el mejor ojo constituyeron el 47% de la variedad de casos total en los países poco desarrollados, cifra que fue del 1% en los países desarrollados ( $P < 0,001$ ). En términos generales, el 72% de los ojos sometidos a cirugía presentó una AV < 6/60. Una AV muy baja antes de la cirugía de cataratas estaba fuertemente relacionada con un bajo nivel de desarrollo a nivel nacional e inversamente relacionado con la TCC del país.

**Conclusión** La proporción de pacientes con una AV preoperatoria muy deficiente es un indicador simple que se puede medir fácilmente con cierta regularidad con el fin de supervisar los avances de los servicios oftalmológicos. Asimismo, Internet puede convertirse en una herramienta eficaz para el desarrollo y apoyo de una red de investigación oftalmológica capaz de ofrecer una visión global de la actividad de los servicios, especialmente en los países en desarrollo.

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