Epidemiology of cataract, other eye diseases and related surgical procedures in Elbasan during 1991-2010

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Abstract

Aim: The aim of this study was to describe the epidemiology of cataract, other eye diseases requiring surgery and related surgical procedures among Albanian cataract patients.
Methods: This study included 4960 patients suffering from eye problems requiring surgery in Elbasan region during 1991-2010. Information was retrieved from Elbasan public hospital and "IGLOR" private eye clinic. Basic demographic information (age and sex) as well as data about eye disorder diagnosis and the respective surgical technique to resolve it was retrieved from medical files of included patients. Chi square was used to test for significant differences between categorical variables. Time data were tested for linear trend.
Results: Mean age of participants was 64.8 years and about 85% of them were 50 years or older (56.6% females).From 2006 the number of patients requiring eye surgery increased. Cataract was present in 79.2% of patients and 78% of these suffered from age-related cataract. Extracapsular cataract extraction (ECCE) was the most common treatment for cataract, followed by phacoemulsification (PHACO). Cataract prevalence was significantly higher among older patients, females and increased significantly in time. ECCE almost completely substituted intracapsularcataract extraction (ICCE) as a method of treatment starting from 1996 until 2006 when PHACO was introduced. From 2006 to 2010 PHACO was the most common surgical treatment for cataract in Elbasan region, offered exclusively in the private sector.
Conclusions: Cataract is becoming an increasing medical and public health concern in Albania. The slow and private sector oriented introduction of more effective treatment techniques requires firm responses from relevant health authorities.

Keywords: cataract, epidemiology, extracapsular cataract extraction (ECCE), intracapsular-cataract extraction (ICCE), phacoemulsification (PHACO).

Introduction

Eye diseases needing surgery to recover comprise a vast variety of conditions, ranging from cosmetic to vision-saving interventions. The most common eye conditions needing surgery include cataract, glaucoma as well as different lid and orbital problems (1).

Cataract, the opacity of the lens of the eye due to normal ageing process in the overwhelming majority of cases (2), is the most common cause of blindness worldwide, counting for 51% of all blindness in the world in 2010, followed by glaucoma in 8% of cases, age-related macular degeneration (5%), childhood blindness and corneal opacities (4%), uncorrected refractive errors (3%) and diabetic retinopathy (1%) whereas in 21% of cases the cause remains unknown (3). In addition, cataract and uncorrected refractive errors are responsible for 33% and 43% of visual impairment cases, respectively (3). In absolute numbers, cataract was responsible for approximately 20 million blind persons and 94 million visually impaired persons in 2010, with most cases residing in developing countries (3). Cataract usually comprises three subtypes (nuclear, cortical and posterior subcapsular), as well as many other forms such as traumatic, congenital cataract, etc., and their prevalence varies according to the population studied, with nuclear subtype prevailing in whites, cortical subtype among African Americans and posterior subcapsular cataract being similarly less prevalent in both groups (4).

Cataract is primarily related to the aging process and it is much more prevalent among older people, more often among females. For example, in 2010 about 4% of all cataract blindness cases were between 0-14 years of age, about 15% were 15-49 years old and approximately 81% were 50 years old or older (3). Other causes of age-related cataract include smoking, diabetes, ultraviolet light exposure, myopia, intake of certain nutrition supplements, use of corticosteroids, etc. (4,5).

When cataract affects the patient's quality of life, the only effective treatment is surgery (6).Cataract surgery rates vary substantially across regions of the world, with developing countries (where the prevalence of cataract blindness is higher) exhibiting the lowest rates (<500 cataract surgery per million population) and developed countries the highest rates (>4000 cataract surgery permillion population) (7).

Surgery for cataracts has evolved from intracapsular cataract extraction (ICCE) surgery,to extracapsular cataract extraction (ECCE) surgery and lately to phacoemulsification (PHACO) during which the lens is dissolved through ultrasonic vibrations (8). ICCE has been the standard procedure in the past but today is only used when eye trauma is so extensive as to make it the most appropriate surgical intervention; ECCE has also been widely used but today is almost completely replaced by PHACO and it remains useful only in cases when the lens is too dense to be dissolved via ultrasonic vibrations (8). Indeed, literature suggests that PHACO is superior to ICCE and ECCE cataract surgery procedures (9), but a recent study suggests that manual small incision cataract surgery (SICS) could be safer, more effective and cheaper than PHACO, except for postoperative astigmatism (10). PHACO and intraocular lens implantation remains the gold standard of cataract treatment, whenever this is possible. Despite evidence, the prevalence and use of different cataract surgery techniques varies widely across the world mainly due to surgeon preferences and available infrastructure (9).

In Albania the information about cataract and related surgical procedures is rather scarce. As noted in an earlier paper (11), the prevalence of cataract is most likely to increase in Albania due to population aging. In the context where aging process is closely linked to the development of cataract, the information about epidemiology of cataract and the surgical procedures used to treat it in Albania might become increasingly relevant in the future.

In this framework, the aim of this study was to assess the epidemiology of cataract and other eye diseases requiring surgery and related surgical procedures during 1991-2010 in Elbasan, one of the major regions of Albania.

Methods

This study is based on patients diagnosed with different eye diseases requiring surgical treatment to resolve, in Elbasan region, during the period 1991-2010. Data were collected from Elbasan regional public hospital and "IGLOR" private eye clinic. This private clinic has been included as a source of information since PHACO is not offered in Elbasan public hospital on regular basis. The only occasion when PHACO has been used in Elbasan regional public hospital was in 1998, with 47 cataract patients undergoing PHACO, and then this method was discontinued due to lack of funds.All patients with eye problems requiring PHACO, therefore, are served in outpatient private clinic(s). The implication of this information is further elaborated in discussion section.

All eye diagnoses have been set by different ophthalmologists. All the information used in this study has been retrieved by meticulously searching all medical records of suitable patients. The inclusion criterion therefore was: having an eye disease requiring surgical intervention during the 1991-2010 time period. Therefore, all patients suffering from eye diseases not requiring surgery during the same period of time were excluded from the study.

We collected basic demographic information about the included patients, such as age and gender. On the other hand, all diagnosis related to eye diseases requiring surgery were recorded as well. In addition, we also retrieved information about the surgical procedure used to treat the respective eye condition.

Information was retrieved for a total number of 4960 patients suffering from eye diseases requiring surgery during 1991-2010.

Table 1. General characteristics of study participants

Variable	Absolute number	Percentage
Total	4960	100.0
Age *(mean ± SD)*	64.8 ± 16.2	
Age group		
0-14 years	69	1.4
15-49 years	666	13.5
≥50 years	4225	85.2
Gender		
Female	2807	56.6
Male	2153	43.4
Year of study		
1991	68	1.4
1992	44	0.9
1993	74	1.5
1994	36	0.7
1995	81	1.6
1996	201	4.1
1997	96	1.9
1998	165	3.3
1999	127	2.6
2000	79	1.6
2001	207	4.2
2002	311	6.3
2003	316	6.4
2004	390	7.9
2005	326	6.6
2006	438	8.8
2007	535	10.8
2008	554	11.2
2009	456	9.2
2010	456	9.2

For our purposes, we distinguished among those patients with cataract from patients suffering from other diseases and also recorded the type or subtype of cataract in each case. All other diseases except for cataract were classified in a separate group. Regarding surgical procedures, we focused mainly on ICCE, ECCE and PHACO procedures and their combination (with each other or different surgical procedures).

We calculated the specific weight of cataract versus all other eye diseases requiring surgery during the study period. In order to detect the time trend of cataract and cataract subtypes we used absolute numbers and respective percentages, in each study year. Chi square test was used to test for significant differences between categorical variables.

For the data analysis the Statistical Package for Social Sciences (SPSS version 17.0), was used.

Results

During 1991-2010 there were 4960 patients with eye problems requiring surgery and treated in Elbasan region, in Albania. Mean age of participants was 64.8 years (70.1 years among cataract patients

Table 2. Prevalence of cataract, other eye diseases and surgical procedures during 1991-2010

Variable	Absolute number	Percentage
Type of eye disease		
Other diseases	1030	20.8
Cataract	3930	79.2
Type of cataract*		
Cataract nuclearis	83	2.1
Congenital cataract	1	0.0
Cataract and glaucoma	185	4.7
Cataract non matura	86	2.2
Cataract presenilismatura	63	1.6
Cataract presenilishypermatura	16	0.4
Cataract complicata	8	0.2
Cataract senilismatura	2070	52.7
Cataract senilishipermatura	993	25.3
Cataract traumatica	42	1.1
Cataract traumatica plus hipermatura	4	0.1
Cataract secondaria	4	0.1
Cataract intumescent	8	0.2
Cataract incipient	7	0.2
Cataract presenilis non matura	1	0.0
Cataract juvenilismatura	4	0.1
Cataract juvenilishipermatura	4	0.1
Cataract subcapsular posterior	122	3.1
Brunescent cataract	50	1.3
White cataract	176	4.5
Black cataract	4	0.1
Type of surgical procedure		
ICCE	88	1.8
ECCE	2634	53.1
PHACO	1201	24.2
ECCE plus PHACO	3	0.1
Other types	1034	20.8

* Only among patients with cataract (n=3930).

– data not shown in tables), more than half (56.6%) were femalesand the overwhelming majority of patients (85.2%) were 50 years or older at the time of intervention. From 2006 and on, it can be noted an increase in the number of patients requiring eye surgery, relatively to earlier study years (Table 1).

Table 2 displays the prevalence (percentage) of cataract and its subtypes as well as the prevalence of other eye diseases requiring surgery during 1991-2010. Approximately 8 out of 10 patients (79.2%) requiring eye surgery were experiencing cataract during this period, making it the most common eye problem to be treated surgically. The most prevalent subtype of cataract was "cataract senilismatura" and "cataract senilishipermatura", diagnosed in 52.7% and 25.3% of patients, respectively (Table 2), followed by "cataract accompanied by glaucoma" and "white cataract", present in 4.7% and 4.5% of patients, respectively, whereas other subtypes of cataract were much more rare.

The most common surgical procedure to treat eye problems during 1991-2010 was ECCE, used in

Table 3 displays the distribution of cataract and

Table 3. Distribution of participants by type of eye disease and age and gender, during 1991-2010

Variable	Type of eye disease		P-value†
	Other diseases	Cataract	
Age group			
0-14 years	63 (91.3)*	6 (8.7)	
15-49 years	542 (81.4)	124 (18.6)	<0.001
≥50 years	425 (10.1)	3800 (89.9)	
Gender			
Female	441 (15.7)	2366 (84.3)	<0.001
Male	589 (27.4)	1564 (75.2)	
Year of study			
1991	43 (63.2)	25 (36.8)	
1992	27 (61.4)	17 (38.6)	
1993	39 (52.7)	35 (47.3)	
1994	18 (50.0)	18 (50.0)	
1995	29 (35.8)	52 (64.2)	
1996	47 (23.4)	154 (76.6)	
1997	49 (51.0)	47 (49.0)	
1998	45 (27.3)	120 (72.7)	
1999	40 (31.5)	87 (68.5)	<0.001
2000	14 (17.7)	65 (82.3)	
2001	52 (25.1)	155 (74.9)	
2002	69 (22.2)	242 (77.8)	
2003	91 (28.8)	225 (71.02)	
2004	146 (37.4)	244 (62.6)	
2005	75 (23.)	251 (77.0)	
2006	60 (13.7)	378 (86.3)	
2007	51 (9.5)	484 (90.5)	
2008	58 (10.5)	496 (89.5)	
2009	34 (7.5)	422 (92.5)	
2010	43 (9.4)	413 (90.6)	
Type of surgery			
ICCE	2 (2.3)	86 (97.7)	
ECCE‡	10 (0.4)	2627 (99.6)	<0.001
PHACO	6 (0.5)	1195 (99.5)	
All other types	1012 (97.9)	22 (2.1)	

* Absolute number and row percentages (in parenthesis).

† P-value according to chi square test.

‡ Includes also the 3 patients intervened with ECCE plus PHACO.

other eye diseases by different age groups, gender, year of study and surgical procedure. The proportion of patients suffering from cataract increases significantly with age and reaches its peak among persons aged 50 years or older, 89.9% of whom had cataract (this compared to only 8.7% of 0-14 years old persons with cataract). Cataract was significantly more common among females (84.3%) than males (75.2%) in our study.

The prevalence of cataract increases significantly and continually through the years during the study period. For example, in 1991 cataract was present in 36.8% of patients requiring eye surgery but in 2010 it accounted for 90.6% of patients in need of surgical treatment for eye problems. The linear trend is also significant (Table 3).

On the other hand, it can be note that ICCE, ECCE and PHACO are almost exclusively used to treat cataract whereas other kinds of surgical procedures are reserved for other eye problems (Table 3).

Table 4 presents information about the specific weight of different types of surgical intervention to treat eye problems, by year of study. It can be noted that ICCE has been used from 1991 to 1996 and predominating over ECCE until 1995. Meanwhile, the weight of ECCE increased gradually, though with fluctuations, from 1995 and remained quite high until 2006 when PHACO emerged largely in the private sector after being used only during 1998 in Elbasan public regional hospital. After 2006, PHACO takes over and dominates all kinds of surgical procedures to treat eye problems in each study year. As regards "all other interventions" they were quite prevalent from 1991 to 1998, although with vast fluctuations in-between, and then their weight reduces substantially in each year, especially after the introduction of PHACO in 2006 (Table 4).

Table 4. Specific weight of different types of surgical eye interventions by year of study, during 1991-2010

Variable	Type of surgical intervention				P-value[†]
	ICCE	ECCE[‡]	PHACO	All other	
Year of study					
1991	15 (22.1)[*]	10 (14.7)	0 (0.0)	43 (63.2)	
1992	8 (18.2)	8 (18.2)	0 (0.0)	28 (63.6)	
1993	24 (32.4)	10 (13.5)	0 (0.0)	40 (54.1)	
1994	16 (44.4)	2 (5.6)	0 (0.0)	18 (50.0)	
1995	14 (17.3)	38 (46.9)	0 (0.0)	29 (35.8)	
1996	5 (2.5)	149 (74.1)	0 (0.0)	47 (23.4)	
1997	1 (1.0)	47 (49.0)	0 (0.0)	48 (50.0)	
1998	0 (0.0)	70 (42.4)	47 (28.5)	48 (29.1)	
1999	0 (0.0)	87 (68.5)	0 (0.0)	40 (31.5)	<0.001
2000	0 (0.0)	65 (92.3)	0 (0.0)	14 (17.7)	
2001	0 (0.0)	156 (75.4)	0 (0.0)	51 (24.6)	
2002	0 (0.0)	241 (77.5)	0 (0.0)	70 (22.5)	
2003	0 (0.0)	226 (71.5)	0 (0.0)	90 (28.5)	
2004	0 (0.0)	244 (62.6)	0 (0.0)	146 (37.4)	
2005	0 (0.0)	252 (77.3)	0 (0.0)	74 (22.7)	
2006	0 (0.0)	204 (46.6)	175 (40.0)	59 (13.5)	
2007	0 (0.0)	222 (41.5)	254 (47.5)	56 (10.5)	
2008	0 (0.0)	244 (44.0)	253 (45.7)	57 (10.3)	
2009	0 (0.0)	199 (43.6)	220 (48.2)	35 (7.7)	
2010	0 (0.0)	163 (35.7)	252 (55.3)	41 (9.0)	

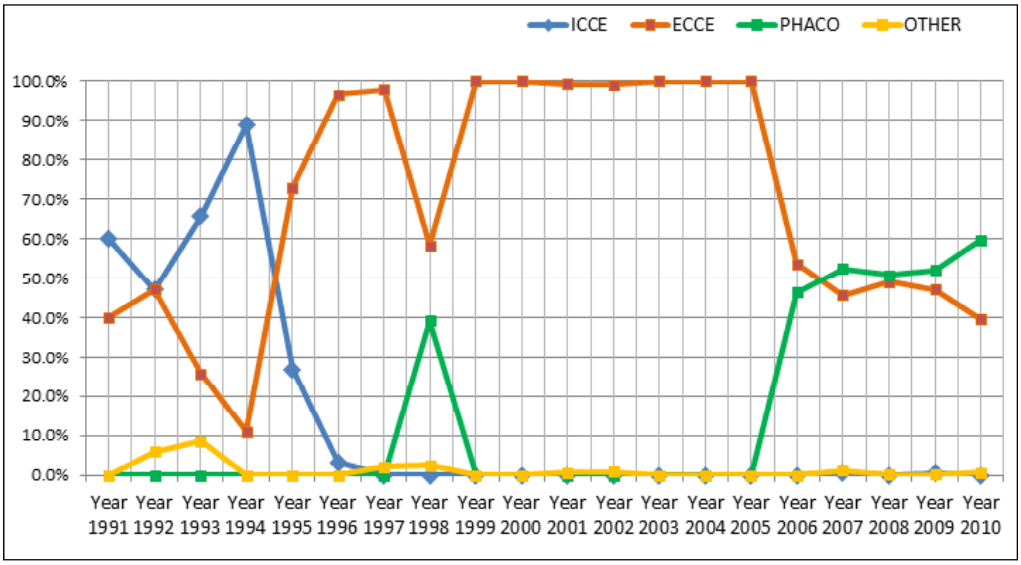
[*] Absolute number and row percentages (in parenthesis).

[†] P-value according to chi square test.

[‡] Includes also the 3 patients intervened with ECCE plus PHACO.

Figure 1 displays the specific weight of different surgical procedures for treating cataract during specific study years. It can be noted that in 1991, the main surgical procedure to treat cataract was ICCE (60% of cataract cases), followed by ECCE (40% of cases). In 1994 the ICCE procedure reached its peak and was used in about 90% of cataract cases and ECCE was applied only in the remaining 10% (Figure 1). In 1995 this trend reversed for good and until 2005 almost all cataract cases were treated by ECCE, except for year 1998 when about 40% of cataract cases in Elbasan public hospital were treated by PHACO. By 2006 the PHACO procedure re-emerges firmly (exclusively in the outpatient private eye clinics) and ECCE and PHACO remain virtually the only surgical procedures to treat cataract. However, after 2006 the main method for treating cataract is PHACO, which became increasingly used to treat cataract until 2010 with a clear domination versus ECCE (60% of cases vs. 40% of cases, respectively).

Figure 1. Specific weight of different eye surgical procedures for treating cataract by year, during 1991-2010



Discussion

The is the first study reporting on the epidemiology of cataract and related surgical procedures in Elbasan, one of the major regions of Albania, during a two-decade period between 1991 and 2010. To our knowledge no previous such attempt has been undertaken, underlying this way the importance of this study for filling the knowledge gap regarding respective research topics in this small South East European country.

The main findings of this study suggest that the average age of patients requiring eye surgery in Albania is about 65 years and almost all (85 out of 100) patients aged 50 years or older will require surgery to treat their eye problems. The majority of eye problems' patients are females and the proportion of patients with eye problems has been almost monotonically increasing since 1991. About 80% of patients with eye problems requiring surgery suffer from cataract and the age-related cataract was the dominating type of cataract in 78% of cases. The prevalence of cataract increases significantly by age, and is significantly higher among females. The prevalence of cataract has increased significantly from 1991 to 2010. ECCE was the most common surgical procedure used

to treat eye problems in the public sector followed by PHACO, which is mainly used in the private sector. These two methods are used almost exclusively to treat cataract. Interestingly, surgical methods other than ICCE, ECCE and PHACO had dominated the treatment of eye problems from 1991 to 1994, and from 1995 ECCE has taken over (except for the year 1998 when PHACO was used in a good proportion of public hospital cataract patients),remaining popular until the wide application of PHACO in 2006 in the private sector, time when this trend reverses. "Other methods of surgical intervention" to treat eye problems have been decreasing in accordance with ICCE, ECCE and PHACO trends.With regard to cataract treatment, ICCE was predominant during 1991-1994; by 1995 ECCE was the main treatment procedure until 2006 when PHACO started to be widely applied in the private sector; PHACO became increasingly used to treat cataract since then and remained the treatment of choice for cataract in 2010 applied in about two-thirds of cataract patients.

Our findings in general are in accordance with the reports of international literature. We found that cataract is positively associated with age and it is extremely prevalent among people aged 50 years or older, a finding similar to international reports that have clearly highlighted the relationship between advance age and cataract development (3,12,13). In our survey, the most common type of cataract was the age-related cataract, a finding in accordance with other reports.

The higher prevalence of cataract among females compared to males, evidenced in our study, is also supported by international literature (12-15).

Approximately 4 out of 5 patients with eye problems treated by surgery during 1991-2010 in Elbasan region in Albania suffered from cataract. This findings is in accordance with literature that suggests cataract as one of the most curable cause of blindness worldwide (16) and therefore many patients suffering from it seek surgical treatment for this condition in Albania as well. According to WHO, by 2020 the target should be to perform about 32 million cataract surgeries annually worldwide (16), thus alleviating the suffering and contributing to improve the quality of life to millions of persons, especially in the deprived areas of the world.

The prevalence of cataract among eye diseases requiring surgery increased almost monotonically and significantly in Elbasan region between 1991 to 2010, from 36.8% in 1991 to a staggering 90.6% in 2010. This finding seems to be in accordance with the aging of population and the increasing risk of cataract development theory, as stated earlier in this report. This theory seems to be plausible in Albania as well, where a clear demographic transition is taking place starting from 1991, the time of the fall of communist regime. The Institute of Statistics of Albania has reported that the proportion of people aged 65 year or older was 6.9% in 2001, jumping to 11% in 2011 and reaching an all-time high level of 13.7% in 2016 (17). In this perspective, the aging of the population could largely explain the increasing of cataract prevalence among eye problem patients in Albania over the years.

On the other hand, as suggested by international literature, the main surgical procedures for the treatment of cataract are ICCE, ECCE and PHACO, although other interventions are available (9,10). ICCE has been the first surgical treatment for cataract but was soon substituted with ECCE due to lower complications of the later (9,18). The real breakthrough for cataract treatment was marked by the application of PHACO treatment, which showed superior to ECCE (9,19). Lately, SICS procedure has been shown to be superior to PHACO in various aspects, including safety and financial aspects (10). This evolution of cataract surgery techniques is evident in our study as well. We have noted that during 1991-1994 ICCE was the main surgical technique for treatment of cataract; then in 1995 there was a substantial increase in the rate of using ECCE for cataract treatment, a procedure which completely substituted ICCE during 1996-2005 and by 2006 the prevailing surgical procedure for the treatment of

cataract was PHACO, which weight increased steadily until 2010 being used in 60% of cataract cases by this year. As a matter of fact, PHACO was applied in 47 cataract patients in Elbasan public hospital in 1998 but then the procedure was never applied again in the public sector due to lack of financial resources, equipment maintenance, etc. This way, the treatment of cataract with PHACO procedure virtually stopped to restart only in 2006 and offered exclusively in the private eye clinics.

Phacoemulsification was first introduced in 1967 and then gradually it became the gold standard of cataract treatment, whenever circumstances would allow it (20). It is interesting to note that novel procedures are applied considerably late in Albania. From our findings we noted that PHACO started to be used in Elbasan in large scale only in 2006. If it could have possible to continue such procedure in the public sector since 1998 than this could have contributed to fewer complications after surgery for the respective patients, better treatment results and higher quality of life for them. A study in Canada reported that already by 1991 there were about 50 PHACO procedures per 100,000 population (21), meaning that such procedure started to be applied much earlier in this country than in Albania. Nevertheless, there could be many reasons for such finding: the late introduction of novel procedures in the Albanian medical practice could be dependent upon medical training, surgeons' interests, type of health care insurance scheme and financial situation of respective population.

PHACO is a relatively expensive procedure (9), a fact that could have played a role in the delayed introduction and wide use of this procedure in Elbasan region in Albania and the entirely abandonment of it in the public sector.In addition, PHACO usually is an outpatient procedure, and as such it could result in lower cataract hospitalization rates (21). In this context, the application of PHACO in outpatient private eye clinics is responsible for the shift of cataract surgical care from public hospitals to the private sector in Albania, increasing this way the financial burden of patients in need.In Albania, outpatient eye care including cataract surgery has developed relatively late, especially in regions and cities other than the capital, thus further contributing to the late introduction of this technique among Albanian patients suffering from cataract. The weak and inappropriate training of eye surgeons could have also played a role regarding this issue. However, the positive aspect is that ICCE has been virtually abandoned, ECCE is being applied less often and PHACO rates are increasing in Albania, in line with international evidence, improving this way the quality of care and quality of life of cataract patients in Albania.

In conclusion, cataract is becoming an increasingly important condition among aging population in Albania and the relevant health and public health authorities need to address this problem. The introduction of novel, more efficient surgical techniques is occurring very slowlythreatening the wellbeing of affected patients and exposing them to avoidable and unnecessary sufferings. Moreover, these techniques are offered exclusively in outpatient private eye clinics and this increases considerable the financial burden of affected patients. There is need to improve the training of eye surgeons in the country and to provide feasible health system solutions that could alleviate the access of cataract patients to the necessary and appropriate treatment procedures.

Conflicts of interest: None declared.

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