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Blindness and Visual Impairment due to Age-Related Cataract in sub-Saharan Africa: Systematic review of recent population-based studies

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ABSTRACT

Aim

We aimed to evaluate age-related cataract as a contributor to blindness and visual impairment (VI) in sub-Saharan Africa (SSA).

Methods

Systematic review of population-based studies published between 2000 and October 2012. Prevalence and proportions of blindness and VI due to cataract, cataract surgical coverage (CSC), % intraocular lens (IOL) implantation and visual outcomes of surgery in accordance with WHO criteria were ascertained.

Results

Data from 17 surveys (subjects mostly aged ≥50 years old) from 15 different countries in SSA were included, comprising 96,402 people. Prevalence of blindness (presenting visual acuity<3/60 in better eye) ranged from 0.1% in Uganda to 9.0% in Eritrea, and the proportion of total blindness due to cataract ranged between 21 and 67%. Cataract was the principal cause of blindness and VI in 15 and 14 studies, respectively. There was a strong positive correlation between good visual outcomes and IOL use (R=0.69, P=0.027). Considerable inter-study heterogeneity was evident in CSC and visual outcomes following surgery, and between 40 and 100% of operations had used IOL's.

Conclusions

Cataract represents the principal cause of blindness and VI and should remain a priority objective for eye care in SSA. However, the prevalence of

blindness and VI due to cataract was variable and may reflect differences in the availability of cataract surgical programmes and cataract incidence.

INTRODUCTION

Cataract can manifest across one's lifespan but its prevalence and incidence rise with increasing age. Age-related (or senile) cataract is the most common cause of cataract in adults. The burden of cataract is expected to continue to pose a greater challenge to health care systems worldwide in future years, consistent with population ageing and increases in life expectancy.[1] Of 39 million people estimated to be blind worldwide in 2010, 51% of cases were attributed to cataract.[2] Regional variations in the prevalence and incidence of blindness and visual impairment (VI) due to age-related cataract exist, with a disproportionate prevalence in low and middle-income populations. Africa is home to 11.9% of the global population, but 15% of the world's blind, the majority of which is due to cataract.[2]

As no effective prevention strategies exist, management of cataract is principally surgical removal of the lens with simultaneous correction of aphakia. In SSA, extra-capsular cataract extraction (ECCE) is usually now performed, increasingly using a small-incision approach, although the use of phacoemulsification is rising. Cataract surgery constitutes one of the most cost-effective of all health interventions.[3] Blindness and VI due to cataract is associated with reduced quality of life[4] and visual function, which can be ameliorated following surgical management.[5] Considerable social and economic disadvantages can result from cataract, especially in poor communities and contributes to the perpetual cycle of poverty.[6] Indeed, provision of cataract surgery may be an effective tool in poverty alleviation.[7] Management of cataract is recognised as a priority of the VISION2020: The Right for Sight global strategy that targets avoidable blindness.

Knowledge of the epidemiology of cataract is crucial for eye care programmes in sub-Saharan Africa (SSA) to effectively plan public health eye care. Since the implementation of VISION2020, several population-based blindness surveys have been conducted globally to guide the implementation, development and extension of services, which include provision for cataract surgery. Moreover, newer rapid assessment methodologies have been developed and used including the rapid assessment of avoidable blindness (RAAB), an extension of the rapid assessment of cataract surgical services (RACSS).[8] We aimed to determine the recent epidemiology of blindness and visual impairment (VI) due to cataract in SSA by investigating its prevalence and public health impact via assessment of relevant WHO targets and indicators.[3]

METHODS

Our literature search was conducted for the years 2000 – October 2012 using Medline, Embase and Google Scholar. Key words used included but were not limited to: *cataract, lens opacity, visual impairment, low vision, blindness, presenting visual acuity, prevalence,* and *population*. All 48 SSA African countries as well as “Africa” and “sub-Saharan Africa” were used in the search terms. Studies were included if they were population-based with a sample size > 1000, reported presenting visual acuity (PVA) with its causes, had a high participation rate (>75%) and provided the standard WHO categories of visual acuity. We also searched reference lists of studies meeting inclusion criteria. Published studies, reported in English, French and Portuguese languages were included.

Where a population-based study of blindness had taken place more than once in a single country, data from the more recent survey (provided methodology was equivalent or superior) is presented, unless two separate geographical areas within the same country were sampled within five years of one another. Estimates from national surveys were used in preference to regional estimates from the same country. Both detailed population-based surveys and rapid assessment methods (RACSS and RAAB) were included.

Blindness was defined using WHO criteria as PVA in the better eye of <3/60 (<20/400; <1.30 LogMAR) while VI was defined as PVA in the better eye of <6/18-3/60 (<20/60-20/400; <0.48-1.30 LogMAR), representing the sum of moderate and severe VI. Thus, we did not investigate mild VI. All-cause prevalence of blindness and VI were extracted from each study, as well as the proportion of blindness and VI due to cataract. Based on this information, the sample population prevalence of cataract blindness and cataract-related VI were computed using the denominator (number of persons examined), while the numerator was calculated using the proportion of blindness/VI due to cataract. We also extracted CSC (at PVA<3/60 and PVA<6/18 levels for persons), visual outcomes following cataract surgery and their causes [good (PVA>6/18), borderline (6/18 to 6/60) and poor (PVA<6/60)], and % IOL implantation. CSC was calculated as CSC=a/(a+c) [where a=aphakic or pseudophakic, c=cataract blindness or VI]. Lastly, we collected data on barriers to cataract surgery (unoperated subjects) and satisfaction with surgery (operated subjects).

RESULTS

Data from a total of 17 surveys from 15 different countries in SSA were included, encompassing 96,402 subjects who were examined **(Table 1)**. Most studies examined only adults aged ≥40 or ≥50 years, however two studies included all ages, [9,10] and one ≥5 years. [11] There were two studies from Cameroon, representing one rural and one urban district.[12,13] The only other country contributing two separate published studies was Tanzania, including RAAB surveys from Kilimanjaro and Zanzibar.[14] [15] Additional RAAB surveys were performed in Botswana [16], Burundi[17], Malawi [18], Rwanda[19], Eritrea[20], and Kenya.[21] Five studies were national surveys. [16,20,9,11,22] All studies employed cluster random sampling, with differences in the sampling used within cluster.

Blindness prevalence ranged from 0.4% in Uganda to 9.0% in Eritrea (**Table 2**). Only two studies - Eritrea and Ethiopia - had blindness prevalence estimates exceeding 5%. Cataract accounted for between 21% of blindness in Cameroon and the highest proportion, 67%, was in Zanzibar, Tanzania. Cataract was the principal cause of blindness in 15 of 17 studies.

The prevalence of VI (sum of moderate and severe VI) ranged from 1.6% in Gambia and Uganda to 17.1% in Ghana (**Table 3**). Cataract was the major cause of VI in 14 of 17 studies. The prevalence of VI due to cataract ranged from 18 to 87%.

CSC data were variable, and for blind persons ranged from 15% in Burundi to 80% in Limbe, Cameroon. This included aphakia and pseudophakia; and for patients who had received cataract surgery, between 62% and 100% had an IOL (**Table 4**)**.** In terms of PVA, the proportion of good outcomes ranged from 23% to 70%. Poor outcomes (VA<6/60) accounted for more than 20% in all studies and ranged from 23% to 64%.

There was a strong positive correlation between good visual outcomes and IOL use (R=0.69, P=0.027). There was an inverse correlation between IOL use and poor visual outcome (R=-0.31, P=0.384). [There was an inverse relationship between the proportion of blindness due to cataract and CSC (persons, blindness): R=-0.50, P=0.137. There was an inverse relationship between CSC (blind) and good visual outcome: R=-0.34, P=0.37].

Causes of a poor visual outcome, barriers to cataract surgery and satisfaction rates with surgery were identified (**Table 5**). Insertion of an IOL is consistently associated with having a good visual outcome. Lack of awareness and inability to pay were frequently cited as major barriers to cataract surgery. The majority of individuals surveyed reported being satisfied with their surgery.

DISCUSSION

We have provided an up-to-date review on blindness and VI due to cataract in SSA obtained from 17 studies of nearly 100,000 individuals. Wide differences in estimates of blindness and VI prevalence due to cataract were evident in this study, but cataract remains the principal cause of blindness in SSA. Although cataract prevalence is high in some Asian and South American populations it is on average lower than Africa and much lower in areas of higher HDI.[23]

Unsurprisingly, the population with the lowest blindness prevalence in this study, Uganda, has had a strong recent history of successful eye care programme delivery. The differences between countries are striking: a 74-fold difference in cataract blindness prevalence between Uganda and Mali who have similar GDP (Per-capita) of US$487 and US$669 respectively (World Bank 2011). Successful blindness prevention programme delivery and available cataract surgical services and human resources especially in rural areas, shorter distances and easier transport for patients, affordable fee structures or free services, and cultural barriers to service access may account for these huge differences. Further studies are required to quantify the resources required to make such differences, and to examine how this has been achieved.

It has been suggested that a cataract surgical rate (CSR) of ≥ 2,000 operations/million population/year should be achieved annually to eliminate unnecessary blindness due to cataract in Africa.[24] This benchmark is in stark contrast to the current situation in many parts of Africa, with over 80% of WHO member states in Africa having a CSR<1000.[3] A substantial increase in

CSR is needed to reduce blindness and VI due to cataract in SSA. Worse HDI ranks are associated with a higher prevalence of cataract blindness, and in SSA a much higher proportion of individuals undergoing surgery for cataract have pre-operative blindness or SVI compared to higher-income populations.[25] The challenge remains reaching blind and visually impaired people by providing accessible, affordable, and sustainable cataract surgical services.

Importantly, any increase in cataract surgical output is usually accompanied by an increase in outcome. The proportion of good outcomes ranged from 23% to 70%, all of which fail to reach the WHO target that ≥ 85% of eyes should achieve PVA<6/18 post-operatively. These proportion of good visual outcomes in most studies were markedy lower than from recent hospital-based studies on this continent.[26 27] Prospective monitoring of outcomes can improve quality,[28] with a dynamic and learning process for the surgeon of focusing on reducing surgical complications, greater emphasis on appropriate selection, need for spectacle correction, and sequelae of surgery. In many settings non-physician cataract surgeons provide the majority of cataract surgery. There remains controversy as to whether this cadre of surgeon is ideal to meeting the cataract surgical needs in SSA. Greater regulation and long-term training of physician-surgeons may provide a better long-term solution.

Population-based data on visual outcomes is highly valuable as clinic/hospital based outcome estimates are not often representative of the visual status in the community. However, as modern techniques using ECCE with IOL implantation are now ubiquitous in almost all areas of SSA, population-based outcomes are likely to be worse as they may capture outcomes for surgeries performed up to many years prior (e.g. ICCE). Uncorrected aphakia remains an important contributor to blindness and VI in many areas of SSA.[29] More recently performed cataract surgery is associated with more frequent use of IOLs[21,30], which in turn is positively correlated with a good visual outcome. In some areas, cataract removal by couching leading to aphakia is associated with extremely poor visual outcomes, even with aphakic correction.[31]

Poor visual outcomes ranged from 23% to 64%, with the causes of poor outcomes being variable, and representing differences in expertise, resources and monitoring/surveillance**.** Understanding the causes of such poor outcomes is vital. Visual outcomes can be ameliorated with improved case selection and avoidance of surgery in patients who won't benefit; improving the quality of surgery and avoiding surgical complications; improving the operative (IOL) and/or post-operative correction of refractive error and; reducing late post-operative complications.[32] Further cataract surgery outcomes data is needed from studies in SSA, and globally, to assess not only the importance and complexity of good outcomes and to revisit the parameters set by the WHO, but most importantly to understand and disseminate knowledge about how to improve outcomes.

It is intuitive that in order to reduce the blindness and VI due to cataract the CSR needs to exceed the cataract incidence rate. Lewallen et al. have modeled the incidence of vision-reducing cataract in Africa using data from RAAB surveys.[33] Such derived estimates may assist further with the planning of services in this resource-poor region where incidence estimates are scarce, and have indicated disparities in cataract incidence in this continent. WHO recommends the establishment of ≥ one cataract unit per district of a million population in order to deal with cataract blindness and VI.[3] CSR's also reflect variations in genetic, environmental, or cultural factors and will vary with population structure, which is not uniform across Africa.[33]

Two indicators can measure the impact of initiatives to target cataract. Firstly, performing serial cross-sectional population-based surveys to demonstrate evidence of a reduction in prevalence of cataract (and blindness and VI due to cataract) over time.[34 35] Another indicator is to measure the CSC which represents a ratio of the met and unmet need for cataract surgery, and is a measurement of the capability of a health care system to provide cataract surgical services to the population.[36] In these studies, the CSC for persons for blinding cataract ranged from 22 to 70%, and was usually higher in men reflecting a probably gender inequity in access to cataract surgical services.[37] CSR is positively correlated with CSC,[25] but CSC does not take into account the quality of surgery provided.

There are several limitations to this review. Inter-study differences exist in relation to the size, age/gender composition, response rates and degree of urbanization as well as degree of government and non-government organization involvement in the surveyed areas. Such differences may account for some of the heterogeneity between individual results. RAAB surveys have several disadvantages including their lack of detailed cataract phenotype information. Nonetheless, the validity of the RAAB compared to a more detailed survey is high.[38]

In conclusion, cataract is by far the most common cause of blindness and VI in SSA. Efforts to reduce the burden of blindness and VI due to cataract should incorporate high-volume, high-quality, affordable cataract surgery that greatly improves the CSR and CSC in such populations. This can be achieved by the implementation of well-run, cost-effective, and sustainable cataract units at the district level. Wide variation in the prevalence of cataract blindness has been shown in this review, and although this may be due to disparities in eye care programme delivery, it may also reflect inter-population differences in cataract incidence. The fundamental problems highlighted by this review are that currently too few cataract surgeries are being performed and there are too many poor outcomes. An open and urgent appraisal of positive successes throughout SSA should be performed and shared.

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AB extracted the data and designed the study and contributed to writing the manuscript. JS and WD analysed the data and wrote the manuscript. All authors were responsible for revising and approving subsequent drafts of the article prior to submission. AB is the guarantor of the article.

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Table 1. Population-based studies from sub-Saharan Africa with data on blindness and age-related cataract

Country	Level	Year Published	Sampling Method	Sampling within cluster	Sample size *(number examined)*	Response Rate (%)	Age (years)	Ref
Botswana	National	2009	CRS	Compact segment sampling	2127	79.9	≥50	[16]
Burundi	Provincial	2012	CRS	Compact segment sampling	3684	97	≥50	[41]
Cameroon	Limbe	2007	CRS	Compact segment sampling	2215	92.3	≥40	[12]
Cameroon	Muyuku	2006	CRS	Random Walk	1787	89.3	≥40	[13]
Eritrea	National	2011	CRS	Compact segment sampling	3163	95.9	≥50	[20]
Ethiopia	National	2007	CRS	Random Walk	25650	85.4	All	[9]
Gambia	National	2000	CRS	Compact segment sampling	13046	92	≥5	[11]
Ghana	City	2012	CRS	House to house census	5603	82.3	≥40	[42]
Guinea	District, Bioko	2002	CRS	Household cluster sampling	3218	NS	All	[10]
Kenya	District, Nakuru	2007	CRS	Compact segment sampling	3503	92.6	≥50	[21]
Malawi	District	2011	CRS	Compact segment sampling	3430	95.7	≥50	[18]
Mali	Sub-national	2008	CRS	Compact segment sampling	2438	NS	≥50	
Nigeria	National	2009	CRS	Random Walk	13599	89.9	≥40	[22]
Rwanda	Western province	2007	CRS	Compact segment sampling	2206	98	≥50	[19]
South Sudan	District	2006	CRS	Random Walk	2499	84.6	≥5	[43]
Tanzania (Kilimanjaro)	Regional	2010	CRS	Random Walk	3436	95.5	≥50	[14]
Tanzania (Zanzibar)	Island	2007	CRS	Compact segment sampling	3160	98.8	≥50	[15]
Uganda	15 neighbouring villages	2002	CRS	NS	4076	98.9	≥13	[44]

CRS: Cluster Random Sampling; NS- not stated

Table 2. Prevalence and leading causes of blindness (PVA < 3/60 in worse eye) in sub-Saharan Africa

Country	Bilateral blindness prevalence (95% CI)	Main cause of blindness	Proportion of blindness(%)	2nd Main cause of blindness	Proportion of blindness (%)	Prevalence of cataract blindness	Ref
Botswana	3.69 (2.4-5.0)	Cataract	47	NS	NS	1.7	[16]
Burundi	1.1 (0.8-1.4)	Cataract	55	PSED	37	0.6	[41]
Cameroon (Limbe)	1.1 (0.7-1.5)	PSED	29	Cataract	21	0.2	[12]
Cameroon (Muyuka)	1.6 (0.8-2.4)	Cataract	62	PSED & Onchocerciasis	14	1.0	[13]
Eritrea	9.0 (8.0-10.0)	Cataract	55	Glaucoma	15	5.0	20
Ethiopia	7.9 (6.9-8.9)	Cataract	50	Trachoma	20	4.0	[9]
Gambia*	0.42	Cataract	45	Other corneal	16	0.2	[11]
Ghana#	1.2	Cataract	44	Glaucoma	22	0.5	[42]
Guinea	3.2 (2.6-3.9)	Cataract	61	Macular affection	25	2.0	[10]
Kenya	2.0 (1.5-2.4)	Cataract	42	PSED	30	0.8	[21]
Malawi	3.3 (2.5-4.1)	Cataract	48	Glaucoma	16	1.6	[18]
Mali	11.07 (9.55-12.6)	Cataract	61	Surgical Complications	10	6.8	
Nigeria	4.2 (3.8-4.6)	Cataract	43	Glaucoma	17	1.8	[22]
Rwanda	1.8 (1.2-2.4)	Cataract	65	PSED	20	1.2	[19]
South Sudan	4.1 (3.4-4.8)	Cataract	41	Trachoma	35	1.7	[43]
Tanzania (Kilimanjaro)	2.4 (1.9-2.9)	Cataract	51	PSED	36	1.2	[14]
Tanzania (Zanzibar)	3.7	Cataract	67	PSED	25	2.5	[15]
Uganda	0.4 (0.3-0.7)	Glaucoma	39	Cataract	23	0.1	[44]

PSED: Posterior Segment Eye Disease; CI: Confidence Interval; NS- not stated

* Estimates for ≥50 years

This study excludes refractive error from table of blindness/VI aetiology.

Table 3. Leading causes of Visual Impairment (VI) in sub-Saharan Africa

Country	Main cause of VI	Proportion of VI (%)	2nd Main cause of VI	Proportion of VI (%)	Ref
Botswana	Cataract	59	NS	NS	[16]
Burundi	Refractive Error	67	Cataract	18	[41]
Cameroon (Limbe)	Cataract	48	Refractive Error	22	[12]
Cameroon (Muyuka)	Cataract	40	PSED	28	[13]
Eritrea	Cataract	55	Refractive Error	31	[20]
Ethiopia	Cataract	34	Refractive Error	26	[9]
Gambia	Cataract	61 (≥ 50 years)	Uncorrected aphakia	12 (≥50 years)	[11]
Ghana*	Cataract	53*	Glaucoma	14*	[42]
Guinea	Cataract	87	Macular affection	29	[10]
Kenya	Cataract	36	Refractive Error	32	[21]
Malawi	Cataract	46	Refractive Error	41	[18]
Mali	Cataract	61	Refractive Error	22	
Nigeria	Refractive Error	57	Cataract	26	[22]
Rwanda	Cataract	55	Refractive Error	30	[19]
South Sudan	Trachoma	58	Cataract	29	[43]
Tanzania (Kilimanjaro)	Cataract	55	Refractive Error	33	[14]
Tanzania (Zanzibar)	Cataract	47	Refractive Error	39	[15]
Uganda	Cataract	57	Refractive Error	19	[44]

PSED: Posterior Segment Eye Disease; VI- Visual Impairment; NS- not stated
VI 6/18 to 3/60
* This study excludes refractive error from table of blindness/VI aetiology.

Table 4. Cataract Surgical Coverage, Visual outcomes following cataract surgery, and %IOL use in sub-Saharan Africa

Country	CSC (VA<6/18) persons			CSC (blind persons [PVA<3/60])			Visual outcome (PVA)		IOL (% of all operated eyes)
	Total persons	Males	Females	Total persons	Male	Female	Good (PVA>6/18)	Poor (PVA<6/60)	
Botswana	53	62	48	62	73	55	NS	NS	NS
Burundi	12	9	13	22	17	24	70	30	100
Cameroon (Limbe)	NS	NS	NS	80	NS	NS	23	58	69
Cameroon (Muyuka)	NS	NS	NS	55	NS	NS	25	64	68
Eritrea	48	50	46	68	71	65	41	39	75
Kenya	51	51	51	78	78	78	50	31	58
Malawi	16	25	10	45	62	30	41	32	68
Mali	34	39	30	59	70	51	28	58	33
Nigeria	NS	NS	NS	NS	NS	NS	30	41	40
Rwanda	21	24	19	47	64	36	24	41	62
Tanzania (Kilimanjaro)	42	48	37	70	73	67	59	23	87
Tanzania (Zanzibar)	20	25	17	60	77	49	32	38	68

CSC- cataract surgical coverage; NS- not stated; PVA- presenting visual acuity; IOL- intraocular lens
No data was available from Ethiopia, Ghana, Guinea, South Sudan and Uganda

Table 5: Causes of poor outcome and barriers to cataract surgery in studies with available data in sub-Saharan Africa

Country	Causes of poor outcome			Associations with poor outcome	Barriers to Surgery	Satisfaction with surgery (post-operative subjects)
	Selection/Co-morbdity	**Surgical complications**	**Uncorrected refractive error, aphakia, late sequelae**			
Cameroon (Limbe)	NS			Aphakia (compared to IOL use). Older age.	Inability to pay (40%), lack of awareness (17%), a feeling they could cope with the cataract (10%) and that they were waiting for cataract to mature (8%).	NS
Cameroon (Muyuka)	NS			Aphakia (compared to IOL use). Older age.	Lack of awareness of cataract (33.3%), inability to pay (30.1%), and a feeling they could cope with the cataract (9.6%).	NS
Eritrea	27%	24%	48%	Having surgery performed at a voluntary or charitable hospital compared to a government hospital	30% reported “Cannot afford”, followed by “Waiting for maturity” (18%), “No company” (17%), “Contra-indication” (12%) and “Old age, no need” (10%).	NS
Kenya	36%	30%	34%	Not specified for poor outcome. However, good outcome was more likely if the surgery was with an IOL, performed in last 5 years or undertaken in a volunteer/charity hospital or private hospital rather than government hospital or eye camp	“Not aware of surgery” (34.1%), “cannot afford the operation” (24.4%), and “no one to take me” (12.2%).	64% were very satisfied, 19% were somewhat satisfied, 5% were indifferent, and 12% were somewhat or very dissatisfied.
Malawi	40%	47%	13%	NS	Old age (‘no need felt’) was reported to be the commonest barrier (23.5%) followed by ‘no one to accompany’ (22.1%), ‘no services nearby’ (13.2) and ‘unaware that treatment was available’ (11.8%).	84.8% of all persons who had surgery were either very satisfied or partially satisfied. Only 3% of persons were very unsatisfied with the results of surgery.
Nigeria NB: Barriers refers to Abubakar et al. Coverage of Hospital-based Cataract Surgery and Barriers to the Uptake of Surgery among Cataract	NS	**19%**	**50%**	In multivariate analysis of data on first-operated eyes, the only variable associated with poor outcome (**<**6/60 at presentation) was non-IOL surgery.	Cost of surgery (over a third), other personal factors (a quarter), and another quarter cited barriers such as being too old, not knowing where to go and fear of surgery. Provider-related factors, such as being told to attend later, were reported by 9.8%. There were significant rural/urban	NS
	This refers to: **Imam et al. Outcome of Cataract Surgery in Nigeria:** **Visual Acuity, Autorefraction, and Optimal**					

Blind Persons in Nigeria:	**Intraocular Lens Powers—Results from the Nigeria National Survey**				differences in cost as a barrier.	
Rwanda	25%	50%	25%	NS	Lack of awareness of the availability of treatment (52%), followed by a perceived lack of services (16%), inability to afford the surgery (16%), and lack of a companion (8%).	41% were very satisfied, 28% were partially satisfied, indifferent (7%), partially dissatisfied (17%), or very dissatisfied (7%).
Tanzania (Kilimanjaro)	31%	38%	25%	Eyes with an IOL had significantly better vision than eyes without	NS	NS
Tanzania (Zanzibar)	The major cause of poor outcome for operations >3yrs ago was selection and presently it is due to sequale. Surgery was a major cause for poor outcome for both time periods.			NS	Unaware of treatment (30%), waiting for cataract to mature (20%) and cost (10%).	56% very satisfied, 25.9% partially satisfied, 7.9% very dissatisfied

Key- NS- not stated; URE- uncorrected refractive error