

The Cataract Impact Study

Summary report



Sarah Polack and Hannah Kuper

International Centre for Eye Health

London School of Hygiene & Tropical Medicine



For further information please see: <https://www.iceh.org.uk/display/WEB/Cataract+impact+study>

Cataract Impact Study: summary report

Funding: This study was funded by grants from CBM, ORBIS International and Sightsavers

Survey teams

	Kenya	Bangladesh	Philippines
Project Lead	Wanjiku Mathenge	Zakia Wadud and Mamunur Rashid	Cristina Eusebio
Ophthalmologists	Onyango, Nyaga	Zakia, Mamunur, Khair, Robert Lindfield	John, Noel, Donald, Annie
Ophthalmic assistants	Flora, Devina, Maina, Maurice	Azad, Noman, Rayhan, Rahmatullah	Cleo, Perla, Tani, Mark, Jemma, Jingjing, Jaja
Interviewers	Rose, Agnes, Emma, Philip, Neemo, Mike	Sheila, Shelly, Tripty, Ratul, Maiin, Alok, Shantosh, Nibir, Rafiq, Lilima, Sumaiya, Sharmin	Rosie, Clint, Erwin, Sheila, Stephen, Mila, Hector, Freda, Joy, Yen
Office Staff	Redempta, Faith	Mustafiz, Faisal, Reaz, Murad,	Leo, Albert, BM, Leo, Sheila

Acknowledgements

We would like express sincere thanks to:

- All the people in who took part in this study;
- Wanjiku Mathenge, Zakia Wadud, Mamunur Rashid and Cristina Eusebio for leading the project sites and making this research possible;
- The ophthalmologists, ophthalmic assistants, interviewers and office staff for their hard work;
- CBM, ORBIS and Sightsavers for funding the study and for their input throughout;
- Allen Foster, Clare Gilbert, Hans Limburg and Astrid Fletcher (LSHTM), Catherine Cross and Eleanor Cousens (SS) and Pam William-Jones (ORBIS) for their guidance and advice as members of the project steering committee;
- Peter Ackland (SS), Mike Davies (CBM), Mavis Campos (CF), Dr Khairul Islam (ORBIS) and Dr Kimani (SSI) for their assistance.



Executive summary

Purpose

The Cataract Impact Study was undertaken among people aged 50 years and above in three low-income countries: Kenya, Bangladesh and the Philippines.

The aim of the study was to assess the impact of cataract surgery on:

- a) household economy
- b) daily activities and time-use
- c) health related quality of life

Methods

In total 704 persons with visual impairment from cataract (cases) and 682 persons without visual impairment (controls) participated in the study, which was conducted from 2005-2008. All participants were interviewed at baseline and those with cataract were offered cataract surgery. One year later both cases and controls were traced and those found were re-interviewed.

Results

The findings showed

At baseline:

- a. **Cases were poorer** than controls with normal vision in terms of assets, self-rated wealth and monthly expenditure;
- b. **Cases were less likely to take part in and spent less time on productive activities** (paid work or household activities) than controls;
- c. **Cases were more likely to report assistance from others with daily activities** than controls;
- d. **Cases had worse health related quality of life** than controls.

At one year follow – up after cataract surgery:

- e. **Monthly expenditure among operated cases increased** compared to baseline in each country;
- f. **Operated cases spent more time on productive activities and were less likely to have assistance** from others compared to baseline;
- g. **The health-related quality of life of operated cases improved** compared to baseline and became similar to the level experienced by controls.

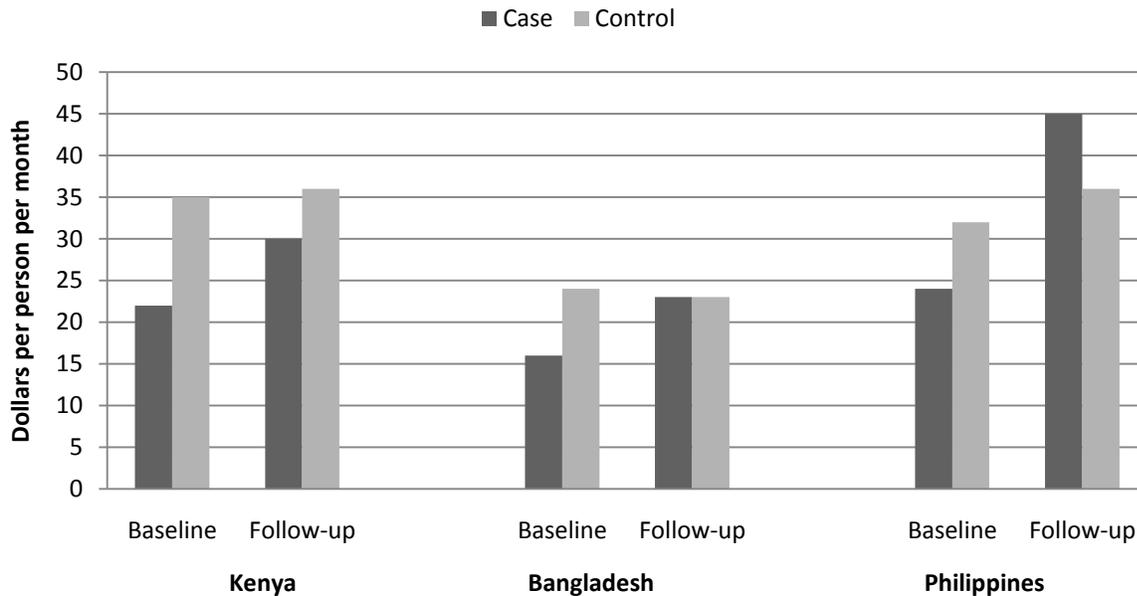


Figure 6: Change in per capita expenditure between baseline and follow-up in operated cases and controls in Kenya, Bangladesh and the Philippines

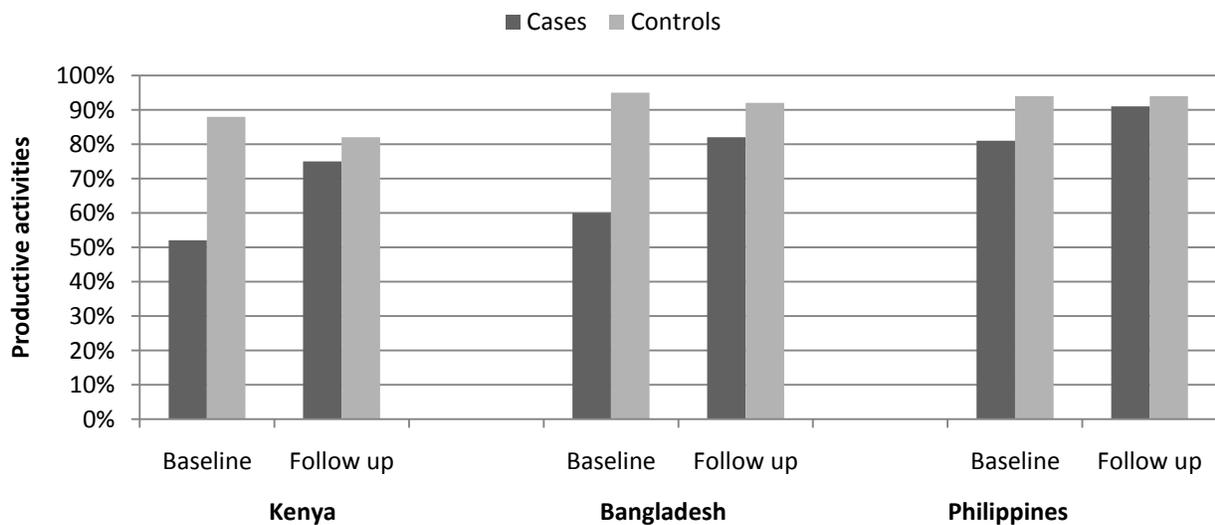


Figure 11: Proportion of operated cases and controls who undertook productive activities at baseline and follow up

Implications

Provision of cataract surgery may contribute towards poverty alleviation, through increasing productive activities of people with cataract and reducing their dependence on other household members for care.

Provision of cataract surgery also substantially improves aspects of quality of life for individuals.

The Cataract Impact Study

Background

Age-related cataract is the leading cause of blindness in the world, responsible for about 17 million (39%) of the 45 million cases of blindness.¹ Visual impairment from cataract is largely confined to people aged over 50 years and, as populations continue to grow and age, the magnitude of this condition is predicted to increase. The majority of vision loss from cataract is in low-income countries. Currently there is very little information on the impact of this visual impairment on the individuals most affected, nor on how this may be alleviated after sight-restoring cataract surgery. Impact can be measured in terms of poverty, daily activities and quality of life.

Poverty

Blindness from cataract and poverty may be linked in a cycle. Poorer people may be less able to access surgical services and therefore remain blind from cataract. Visual impairment may also exacerbate poverty, through reduced productivity of the visually impaired person as well as lost opportunity costs to household members who look after them.²⁻⁴ After cataract surgery people may be more likely to engage in productive activities and this may improve their economic circumstances. Although these links may seem self-evident, there is little evidence supporting or refuting these links.

Alleviation of poverty through provision of cataract surgery could contribute towards the achievement of the first Millennium Development Goal to 'Eradicate extreme poverty and hunger', since the vast majority of cataract blindness is in low-income settings, and among the poorest people in those communities.⁵ However, there is an absence of empirical data either supporting or disputing the impact of cataract surgery on poverty alleviation in low-income settings.

Daily activities and time-use

Participation in different daily activities has important implications for well-being. There is substantial evidence of a positive relationship between involvement in activities and well-being, cognitive function and life satisfaction among older adults.⁶⁻⁸ Although studies have shown that people report less *difficulty* undertaking daily activities after cataract surgery, information is lacking on whether actual participation in and time spent on different daily activities changes. This link is likely to be complex as cataract predominantly affects older people who may experience other co-morbidities influencing their engagement in activities.

Quality of life

The assumption behind cataract surgery is that it brings improvements to the health related quality of life (HRQoL) of the patient. However, the degree to which this occurs is not captured by clinical measures such as

visual acuity (VA) and so the patients' views must be assessed directly to measure HRQoL. Measures to assess HRQoL include condition specific instruments (e.g. relating to visual impairment) and generic HRQoL instruments which are applicable to all health conditions. The impact of cataract surgery on HRQoL has been explored in high-income countries with inconsistent results. A positive impact of cataract surgery on vision-related QoL (VRQoL) has been consistently shown, while findings on generic HRQoL are mixed with some studies showing an improvement,⁹⁻¹⁰ and others finding no change.¹¹⁻¹³ Few of these studies have been undertaken in low-income settings,¹⁴⁻¹⁵ particularly for generic HRQoL.

Cataract Impact Study

We undertook the Cataract Impact Study to fill these gaps in knowledge. This was a three year study to explore the impact of cataract surgery on poverty, time-use and quality of life among adults aged ≥ 50 years in three low-income countries: Kenya, Bangladesh and the Philippines.

Study participants in the Cataract Impact Study



AIMS AND OBJECTIVES

Aim

To assess the impact of cataract surgery on poverty, time-use and health related quality of life in Kenya, Bangladesh and the Philippines.

Objectives

In adults aged ≥ 50 years in Kenya, Bangladesh and the Philippines:

At baseline

1. To explore the relationship between visual impairment from cataract and poverty
2. To explore the relationship between visual impairment from cataract and daily time-use
3. To explore the relationship between visual impairment from cataract and HRQoL

At follow up

4. To describe and quantify the impact of cataract surgery on poverty
5. To describe and quantify the impact of cataract surgery on daily time-use
6. To describe and quantify the impact of cataract surgery on HRQoL

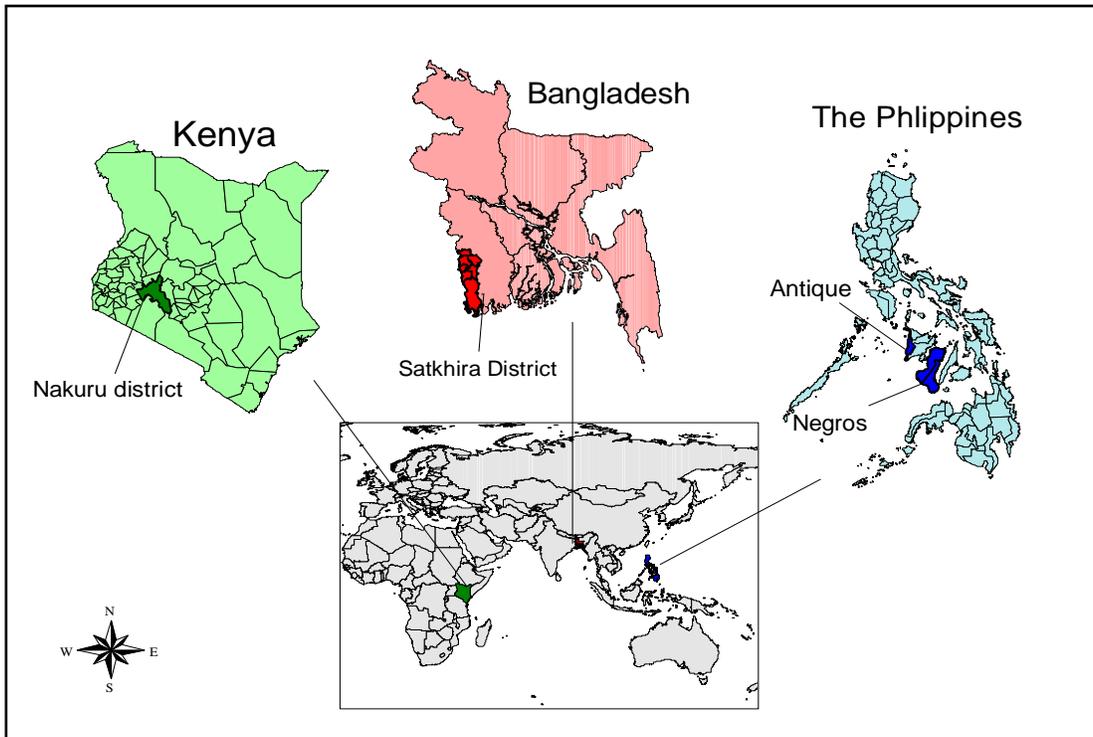


Figure 1: Study sites

METHODS

Study design overview

The 'Cataract Impact Study' was a longitudinal intervention study conducted in Nakuru district (Kenya), Satkhira district (Bangladesh) and Negros Island and Antique district (the Philippines) between 2005 and 2007 (Figure 1). At baseline, people with visual impairment from cataract (cases) and people without visual impairment (controls) were identified in their communities. They were interviewed about economic indicators, time-use and HRQoL. All cases were offered free or subsidized surgery. Approximately one year later (follow up) cases and controls were re-traced, re-examined and re-interviewed and the outcome measures were compared between baseline and follow up (Figure 2).

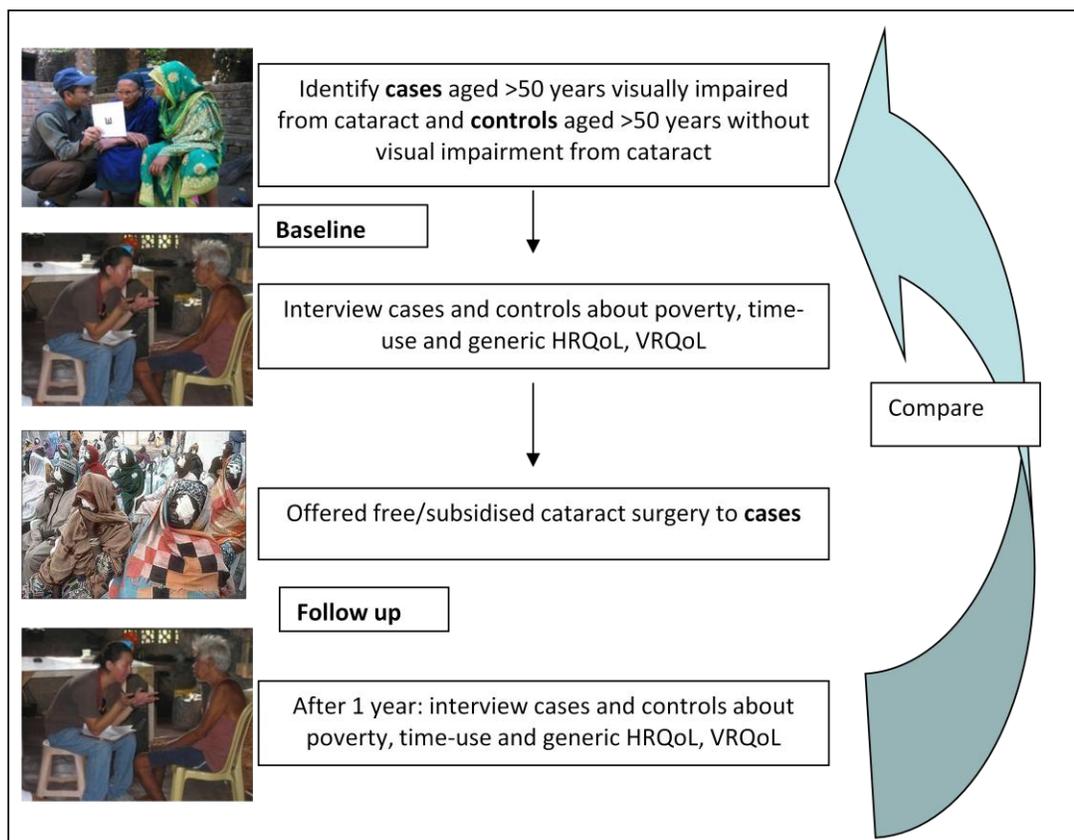


Figure 2: Overview of study design to assess the impact of cataract surgery on poverty, time-use and HRQoL

Study population

At baseline, cases and controls were identified primarily through a population-based blindness survey (Rapid Assessment of Avoidable Blindness) which included >3600 people aged ≥ 50 years in each setting.¹⁶⁻¹⁸ Cases were people aged ≥ 50 years with pinhole corrected visual acuity (VA) $< 6/24$ in the better eye due to cataract, diagnosed by testing VA with a tumbling E chart and assessing the presence of cataract through ophthalmic examination. Due to logistical and time constraints, additional cases were identified in each setting through

community-based case detection using the same cluster sampling procedure, examination and case definition as above. In Kenya, the first 50 patients (from a set date) attending the local hospital for cataract surgery and meeting the case definition, were also recruited for the study.



Measuring visual acuity in Kenya

For every case identified in the surveys or through case finding we also randomly selected an age and gender matched control subject without visual impairment. Controls were included to enable baseline comparisons of people with and without visual impairment from cataract and to assess for any temporal changes in the general study population in terms of poverty, time-use and HRQoL between baseline and follow up.

Baseline and follow up

Baseline surveys were conducted between Jan 2005-May 2006. All cases were counseled and offered surgery at one hospital in the study district following standard procedures for that hospital. Free surgery was offered to participants in Kenya and Bangladesh. In the Philippines a fee was requested but those who could not afford the fee were offered free surgery. In Kenya and Bangladesh the surgery was conducted at a government/central hospital, while in the Philippines this was undertaken at a private clinic. In Bangladesh a vehicle was provided by the hospital to collect the patients while in Kenya and the Philippines patients made their own travel arrangements, but were reimbursed travel costs. Follow up surveys were undertaken approximately one year later, during the same climatic season as baseline.



An interview in Bangladesh

Interviews

At both baseline and follow up, ophthalmic examinations and interviews were conducted in respondents' own homes (except for hospital cases who were interviewed in the clinic at baseline). Interviews were conducted by trained interviewers and were regularly observed by supervisors.

The interviews comprised the following:

1. Poverty

Poverty was assessed using three different measures:

- **Household per capita expenditure:** It is difficult to collect data on income in surveys in low income countries where a lot of work undertaken is farming for home production of food. We therefore measured household per capita expenditure as a proxy for income, and this was assessed using methods developed for the World Bank's Living Standards Measurement Survey.¹⁹ The person responsible for finances in the household was interviewed to assess household consumption during the previous month of goods produced through home-production, bought, or received as gifts or payment. Items were included on food, education, household expenses and personal expenses and rent. In total 79-90 items were included per country. Table 1 provides an example of some of the items included. The value of these items was summed and divided by the number of household members to calculate household monthly per capita expenditure.
- **Assets:** data were collected on standard indicators of socio-economic-status including number and type of different assets (e.g. cattle, furniture, electrical goods) and household characteristics (e.g. building materials of the floor, roof and walls; type of toilet and number of rooms). These data were used to develop a socio-economic index score for each participant.
- **Self rated wealth:** the household informant was asked to rank their household's wealth relative to other households in the community on a scale from 1 (poorest) to 10 (wealthiest).

Table 1: Example of consumption data collected in Kenya

Food Item	Was [..] eaten by this household in the past month?		What was the value of [..] eaten from purchases in the past month?	What was the value of [..] eaten from <i>own production</i> in the past month?	What was the value of [..] eaten received as gifts in the past month?	What was the value of [..] eaten received as payment in the past month?
	0= No	1= Yes	Shillings	Shillings	Shillings	Shillings
Rice	0	1				
Beans	0	1				
Fresh Fish	0	1				
Canned foods (fish, fruit)	0	1				
Soft drinks	0	1				

2. Activities and time-use

Data were collected using the ‘stylised activity list’ developed for the World Bank’s Living Standards Measurement Survey.²⁰ Cases and controls were asked whether they had been involved in each of a preset list of common daily activities during the last week and if they had, whether they had been involved in the activity yesterday. Those who had been involved in an activity ‘yesterday’ were asked to estimate how much *time* they had spent on the activity and whether they received any assistance from another person in performing that activity. Table 2 lists these activities and how they were grouped for analysis. Interviewers checked that total time reported was 22-26 hours and if not, went through the list again with the respondent. This method provided three different types of data:

- **Participation:** whether or not participants had undertaken each activity during the previous week
- **Time:** the amount of time spent on different activities during the previous day
- **Assistance:** whether or not participants had assistance with activities during the previous week

Table 2: Time-use data: activities included in the questionnaire and how they were grouped for analysis.

Specific activities included	Activity group	
Sleep, bathing, dressing, eating, other	Personal	
Cooking/washing dishes, cleaning house/clothes, shopping, looking after children/elderly/sick, other	Household/family	Productive activities*
Agriculture, animal rearing, fetching firewood/water, processing agricultural products/food, other	Paid work	
Agriculture, animal rearing, fetching firewood/water, processing agricultural products/food, other	Work for own use	
Social visits, attending ceremonies, attending meetings	Leisure outside home	
Reading/listening to radio/watching TV; chatting, relaxing with friends/family; prayer (Bangladesh), other	Leisure inside home	
Time spent alone and not engaged in any activity at all	No activity	

*NB Household/family activities, paid work and work for own use were all defined as productive activities

Productive activities and leisure time



Quality of life

We used two different instruments to assess aspects of health related QoL

- **Vision-related quality of life:** This was measured using WHO/PBD VF20, a new vision specific instrument proposed by the WHO as a cross cultural tool for assessing VRQoL in low-income settings.²¹

This instrument consists of 20 questions divided into three sub-scales:

- overall eyesight rating (1 question)
- general functioning (14 questions) e.g. “because of your eyesight how much difficulty do you have going down steps or stairs?”; response options: none/mild/moderate/severe/extreme or cannot do
- psychosocial (4 questions) e.g. “ Because of your eyesight how often have you felt that you are a burden on others?” response options: Never/rarely/sometimes/often/very often

Scores were transformed to be out of 100, with higher scores reflecting better quality of life.

- **Generic health related quality of life:** This was measured through EuroQoL, an instrument developed by a network of European researchers to assess generic HRQoL and can be applied regardless of the medical condition being evaluated.²² It includes two components. The first consists of five domains: mobility, self care, usual activity, pain/discomfort and anxiety/depression. Respondents are asked to rate each of these as either having no problem, some problem or extreme problem. The second measures self-rated health by asking participants to rate their ‘health today’ on a scale ranging from 0 (‘worst imaginable health state’) to 100 (‘best imaginable health state’).

In addition, at follow up semi-structured interviews were conducted with selected operated cases in Kenya (20 cases) and Bangladesh (25 cases) at follow up to explore in more depth the impact of cataract surgery on their lives.

Socio-demographic characteristics

Data were also collected on standard socio-demographic indicators (age, gender, marital status, education, literacy)

Ethical approval

Ethical approval for this study was granted by ethics committees of the London School of Hygiene & Tropical Medicine, Kenya Medical Research Institute, Bangladesh Medical Research Council and the University of St. La Salle, Bacolod, The Philippines. Written consent was obtained before all interviews.

RESULTS

Rapid Assessment of Avoidable Blindness (RAAB)

An additional aim of this project was to pilot test a new blindness survey methodology: the Rapid Assessment of Avoidable Blindness (RAAB). The majority of cases were identified within the context of a RAAB in each study country. The RAAB method was pilot tested, modified, finalised and disseminated as part of this study^{17,23} and this included a one week workshop in Kenya to train 12 international trainers in RAAB.

The RAABs also provided estimates of the prevalence and causes of blindness in people aged ≥ 50 years in each of these settings. The summary of results is provided in Table 3.

Table 3: Summary of results from the Rapid Assessment of Avoidable Blindness (RAAB)

Setting	Number of people examined (response rate %)	Prevalence of blindness*	Prevalence of visual impairment**	Cataract as a cause of blindness	Most commonly reported barriers to cataract surgery
Kenya	3503 (93%)	2.0% (1.5-4.4%)	5.8% (4.8-6.8%)	42%	Lack of awareness Cost
Bangladesh	4868 (92%)	2.9% (2.4-3.5%)	8.4% (7.5-9.3%)	79%	Lack of awareness Cost
Antique, Philippines	3177 (83%)	3.0% (2.4-3.6%)	7.3% (6.4-8.2%)	72%	Lack of awareness Cost
Negros, Philippines	2774 (76%)	2.6% (2.0-3.2%)	11.0% (9.6-12.4%)	75%	Lack of awareness Cost

*Blindness: presenting VA $<3/60$ in better eye

**Visual impairment: presenting VA $<6/18$ and $\geq 6/60$ in better eye

- Kuper H, Polack S, Limburg H. Rapid assessment of avoidable blindness. *Community Eye Health*. 2006 Dec;19(60):68-9.
- Mathenge W, Kuper H, Limburg H, Polack S, Onyango O, Nyaga G, Foster A. Rapid assessment of avoidable blindness in Nakuru district, Kenya. *Ophthalmology*. 2007 Mar;114(3):599-605.
- Wadud Z, Kuper H, Polack S, Lindfield R, Akm MR, Choudhury KA, Lindfield T, Limburg H, Foster A. Rapid assessment of avoidable blindness and needs assessment of cataract surgical services in Satkhira District, Bangladesh. *Br J Ophthalmol*. 2006 Oct;90(10):1225-9.
- Eusebio C, Kuper H, Polack S, Enconado J, Tongson N, Dionio D, Dumdum A, Limburg H, Foster A. Rapid assessment of avoidable blindness in Negros Island and Antique District, Philippines. *Br J Ophthalmol*. 2007 Dec;91(12):1588-92.

Study population

The baseline survey included 196 cases visually impaired from cataract in Kenya and 128 controls with normal vision, 217 cases and 280 controls in Bangladesh, 238 cases and 163 controls from the Philippines. Uptake of cataract surgery was generally low: 68% of cases identified at baseline attended for surgery ('operated cases') in Kenya, 46% in Bangladesh and 47% in the Philippines. Response rates at follow-up were high: 80% for operated cases and 75% for controls in Kenya; 85%, 80% respectively in Bangladesh and 88%, 86% in the Philippines.

Clinical outcome from cataract surgery

The proportion of eyes that had a good outcome from surgery (defined as presenting $VA \geq 6/18$) was 62% in Kenya, 67% in the Philippines and 80% in Bangladesh. No country therefore reached the WHO recommended level for good outcome after cataract surgery (less than 20% borderline/poor outcome – $VA < 6/18$ - without correction). In Kenya and the Philippines the main cause of adverse outcome was refractive error (37% and 49% respectively of all $VA < 6/18$) followed by co-morbid ocular disease (26% and 27%). In Bangladesh the main cause of borderline/poor outcome was co-morbid disease (58%) and then surgical complications (21%).

Lindfield R, Kuper H, Polack S, Eusebio C, Mathenge W, Wadud Z, Rashid AM, Foster A. Outcome of cataract surgery at one year in Kenya, the Philippines and Bangladesh. *Br J Ophthalmol.* 2009;93:875-80.

Poverty

At baseline (before surgery):

- Both cases and controls were poor, subsisting on average on less than 1 dollar per day and most of the expenditure was on food
- Cases visually impaired from cataract had 20-28% lower per capita household expenditure (PCE) compared to controls with normal vision (Figure 3)
- Cases also had lower asset scores compared to controls at baseline (Figure 4)
- Self-rated wealth of households was lower among cases compared to controls, except in the Philippines (Figure 5)
- There was no consistent pattern of association between PCE and age, gender or level of visual impairment due to cataract among the three countries.

Kuper H, Polack S, Eusebio C, Mathenge W, Wadud Z, Foster A. A case-control study to assess the relationship between poverty and visual impairment from cataract in Kenya, the Philippines, and Bangladesh. *PLoS Med.* 2008 Dec 16;5(12):e244.

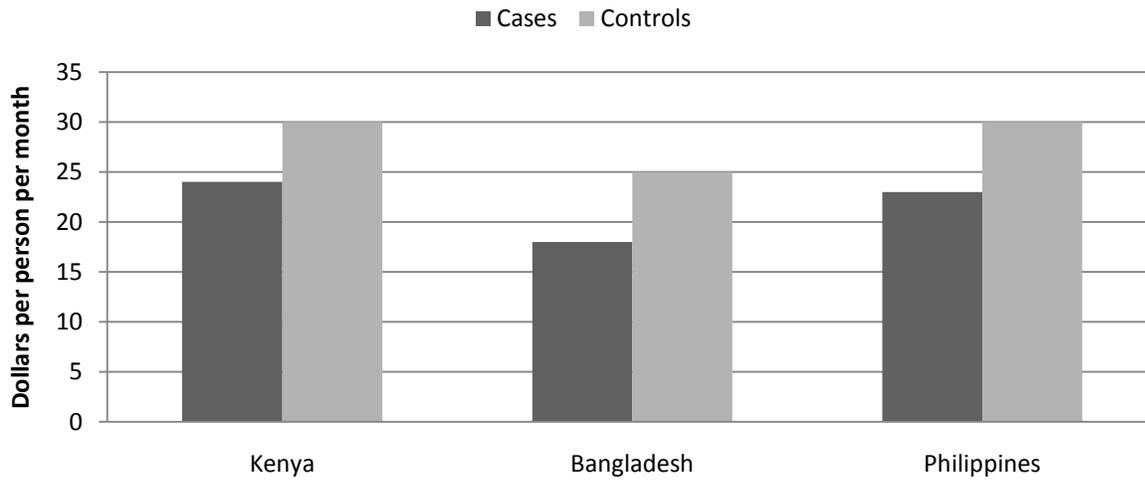


Figure 3: Baseline per capita expenditure in cases compared to controls

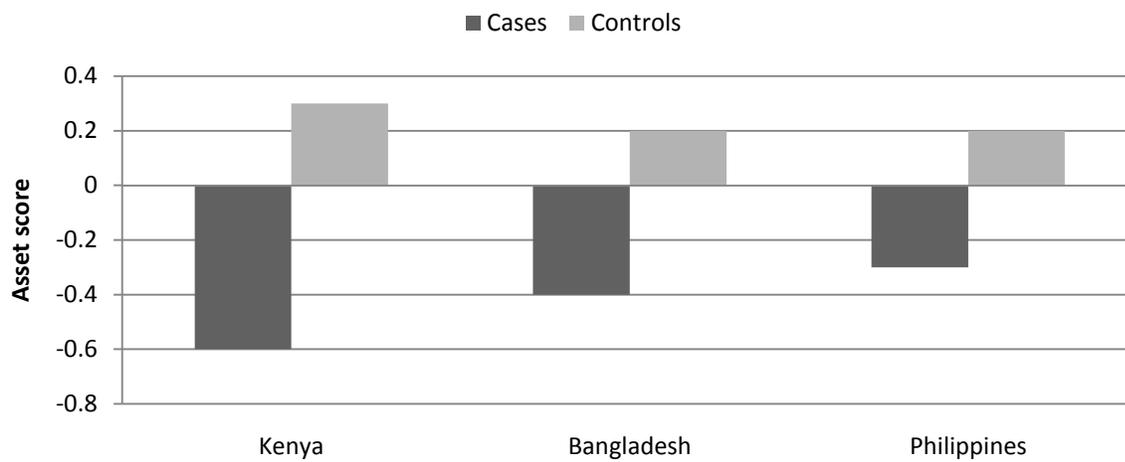


Figure 4: Baseline asset score in cases compared to controls

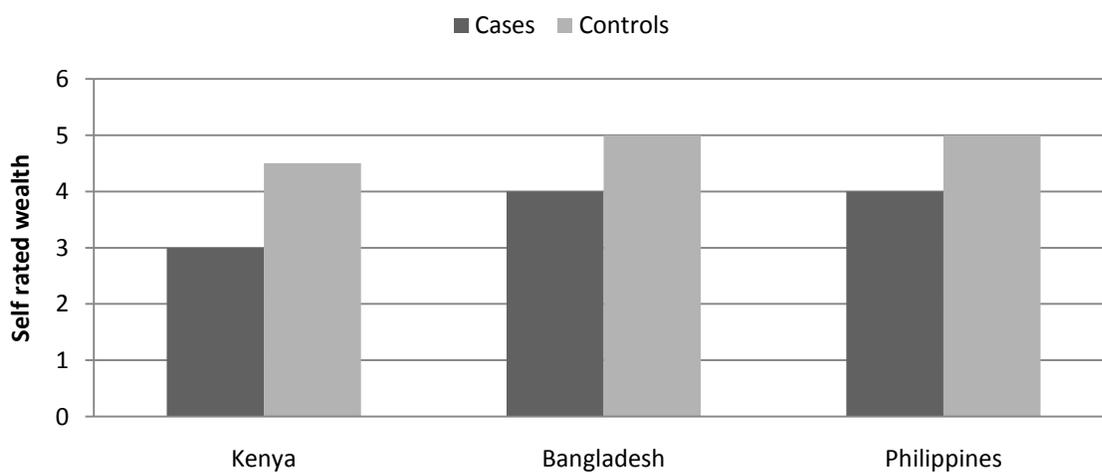


Figure 5: Baseline self-rated wealth in cases compared to controls

At follow up (after surgery):

- PCE had increased significantly among operated cases compared to baseline in each of the three settings so that they were no longer poorer than the controls (Kenya: \$30 in cases versus £36 in controls, Bangladesh: \$23 vs \$23, Philippines: \$45 vs \$36). (Figure 6)
- There were smaller increases in self-rated wealth and no changes in assets.
- Changes in PCE were apparent in different socio-demographic and ocular groups.
- The largest PCE increases occurred among the poorer cases.

Kuper H, Polack S, Mathenge W, Eusebio C, Wadud Z, Mamunur R, Foster A. Does cataract surgery alleviate poverty? Evidence from a multi-centre intervention study conducted in Kenya, the Philippines and Bangladesh. Submitted Plos One

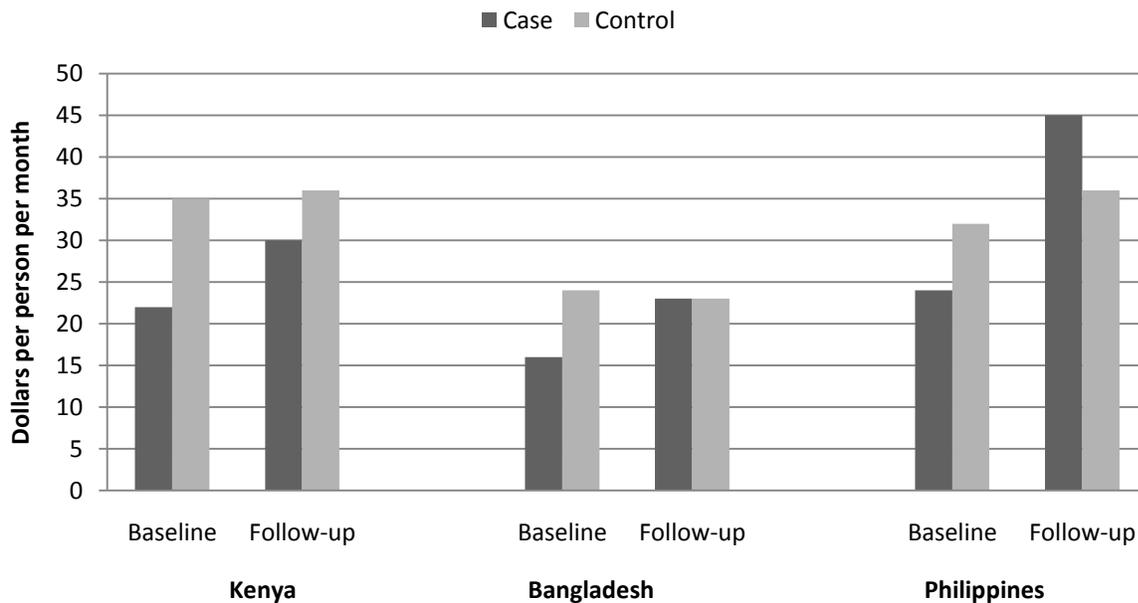


Figure 6: Change in per capita expenditure between baseline and follow-up among operated cases and controls in Kenya, Bangladesh and the Philippines

Daily activities and time-use

At baseline:

- In each country cases were significantly less likely to undertake productive activities (household/domestic work, work for own use and paid work) compared to controls (Kenya: cases 57% vs controls 89%; Bangladesh: 57% vs 93%; the Philippines: 79% vs 94%) (Figure 7)
- Cases were also significantly less likely to have a paid job other than working in the field owned by the household, compared to controls (Kenya: 1% vs 8%; Bangladesh: 8% vs 18%; Philippines: 6% vs 15%)
- Cases spent significantly less time (2-3 hours) on productive activities compared to controls (Figure 8). This effect was most pronounced amongst cases that were blind or only had perception of light (Figure 9).
- Cases spent significantly more of the previous day on 'no activity' in Kenya (average 6hrs 36mins) and Bangladesh (5hrs 20mins) compared to controls (4hrs and 3hrs 26mins respectively) while in the Philippines cases spent an average of 1.5 hours more time on 'leisure in the home' compared to controls.
- Cases were substantially more likely to report receiving assistance with activities during the previous week compared to controls (Kenya: cases 27% vs controls 3%; Bangladesh: 47% vs 9%; the Philippines: 22% vs 9%) (Figure 10). The majority of assistance was for personal activities (washing, dressing, eating).

Polack S, Kuper H, Eusebio C, Mathenge W, Wadud Z, Foster A. The impact of cataract on time-use: results from a population based case-control study in Kenya, the Philippines and Bangladesh. *Ophthalmic Epidemiol.* 2008;15:372-82.

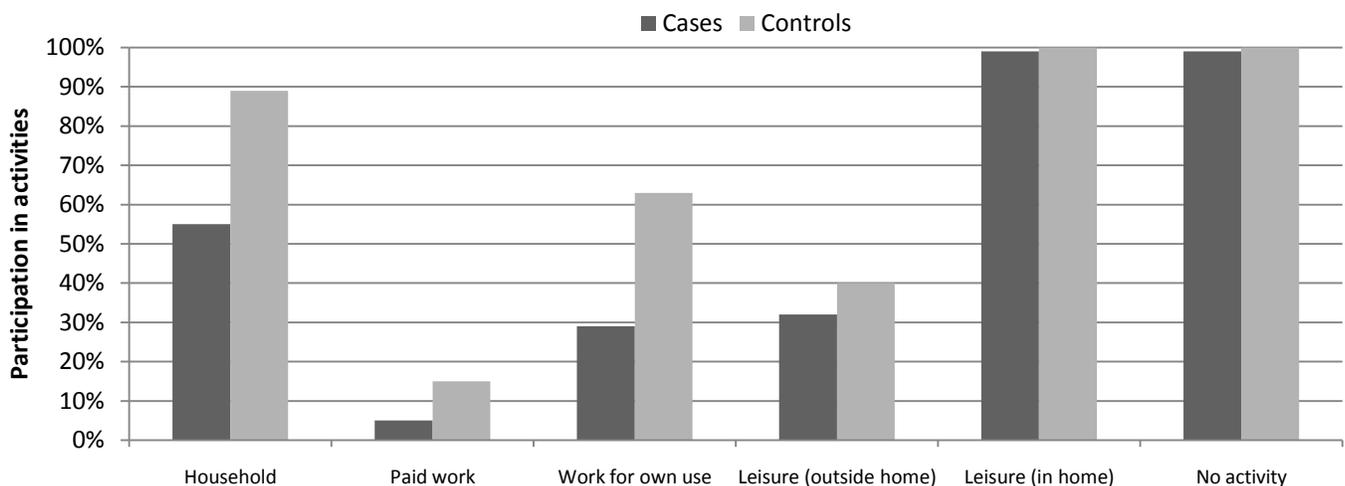


Figure 7: Baseline proportion of cases and controls participating in different activities in Bangladesh. Patterns were similar in the other countries

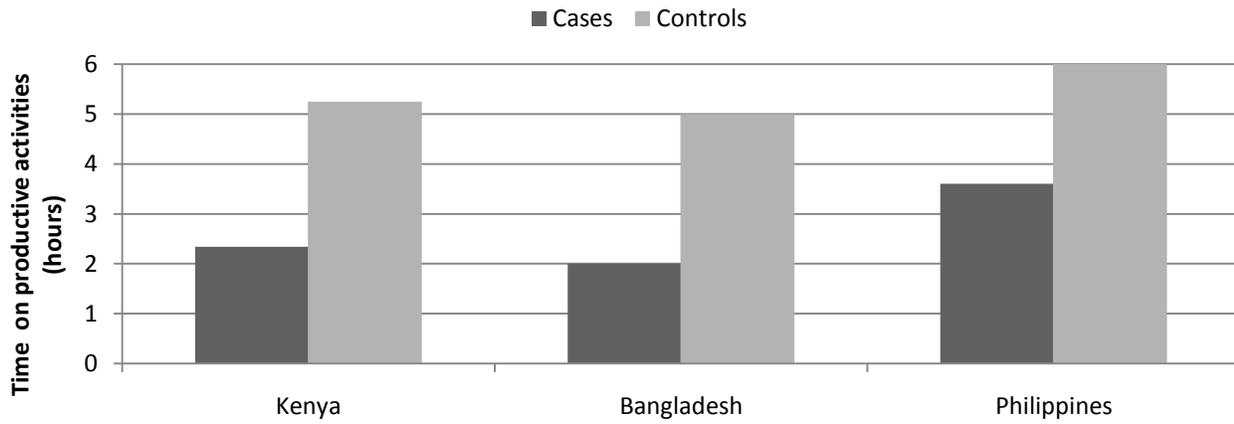


Figure 8: Baseline time spent on productive activities among cases and controls

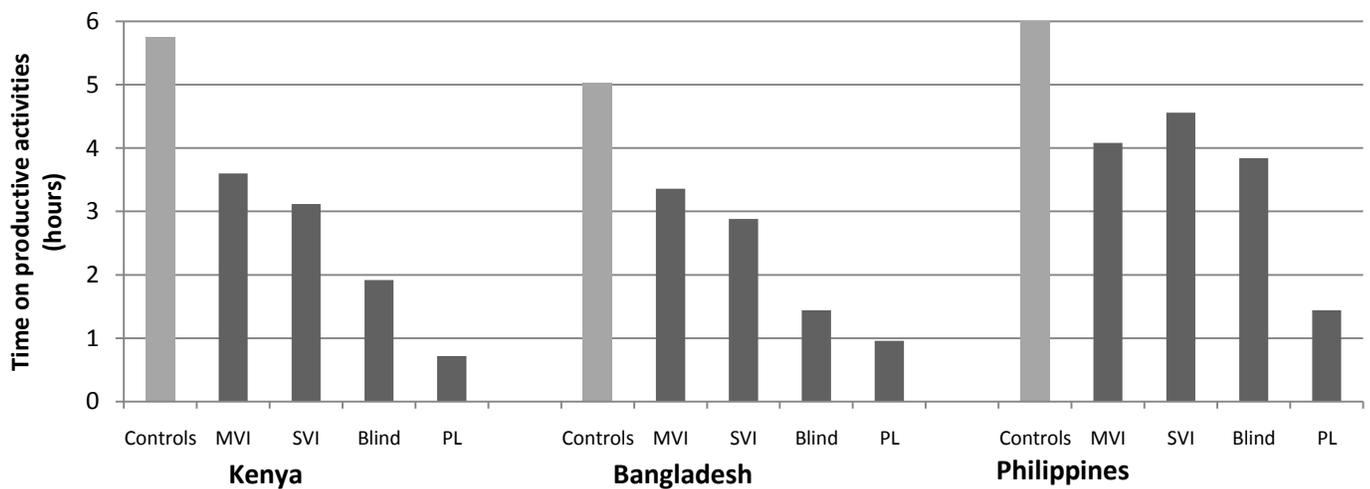


Figure 9: Baseline time spent on productive activities by level of visual acuity. Controls: normal vision ($\geq 6/18$); MVI: moderate visual impairment ($<6/24 \geq 6/60$); SVI: severe visual impairment ($<6/60 \geq 3/60$); blind ($<3/60 > PL$) and PL: Perception of light

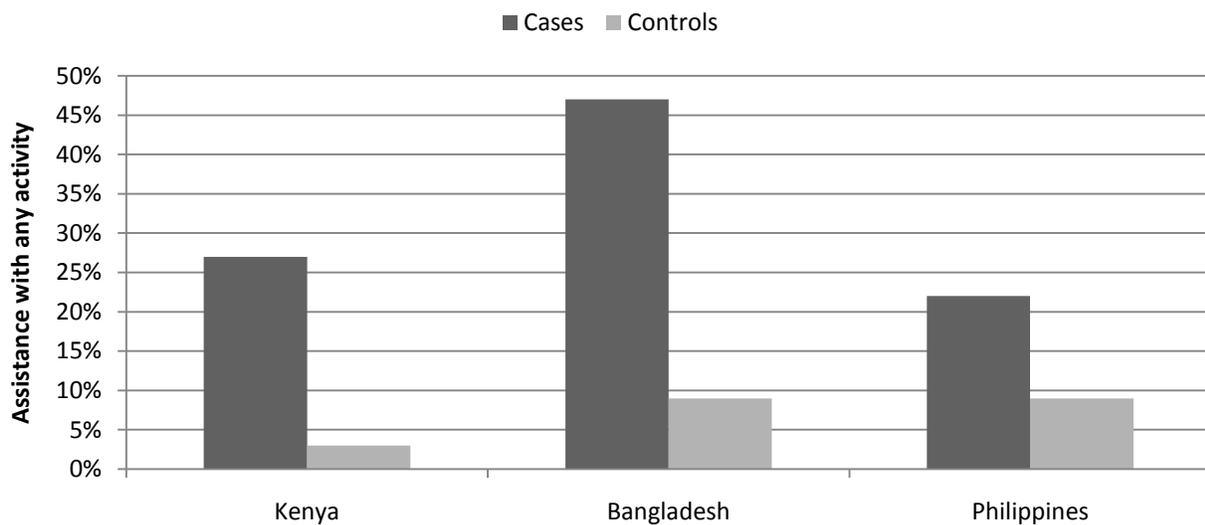


Figure 10: Baseline proportion of cases and controls who reported having assistance with activities

At follow up (after surgery):

- There was a significant increase in the proportion of operated cases who had engaged in productive activities compared to baseline; overall, nearly 25% more operated cases undertook productive activities at follow-up in Kenya and Bangladesh, while for the Philippines the increase was 10% (reflecting the higher proportion engaged at baseline) (Figure 11).
- Average time spent on productive activities by operated cases increased significantly by 1-2 hours compared to baseline in all three settings (Figure 12).
- Time spent in 'inactivity' by operated cases in Kenya and Bangladesh decreased significantly by approximately two hours compared to baseline (Figure 12). In the Philippines time spent on leisure inside the household decreased by nearly one hour.
- The proportion of operated cases reporting assistance with any activity during the previous day was more than halved compared to baseline (Figure 13).

Polack S, Eusebio C, Mathenge W, Wadud Z, Rashid M, Foster A, Kuper H. The impact of cataract surgery on activities and time-use: results from a longitudinal study in Kenya, Bangladesh and the Philippines. PLoS One. 2010 ;5(6):e10913.

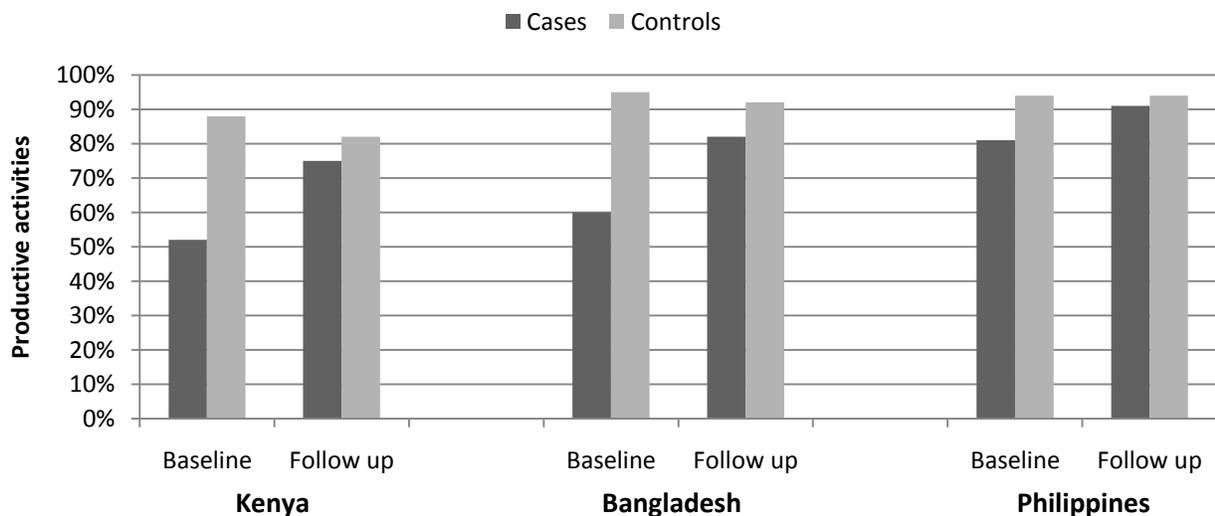
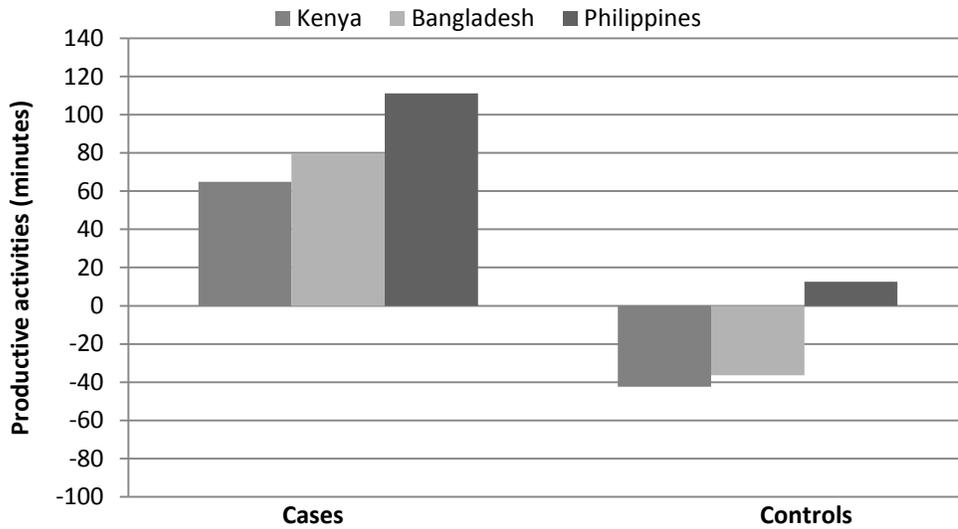


Figure 11: Proportion of operated cases and controls who undertook productive activities at baseline and follow up

A) Productive activities



B) Inactivity

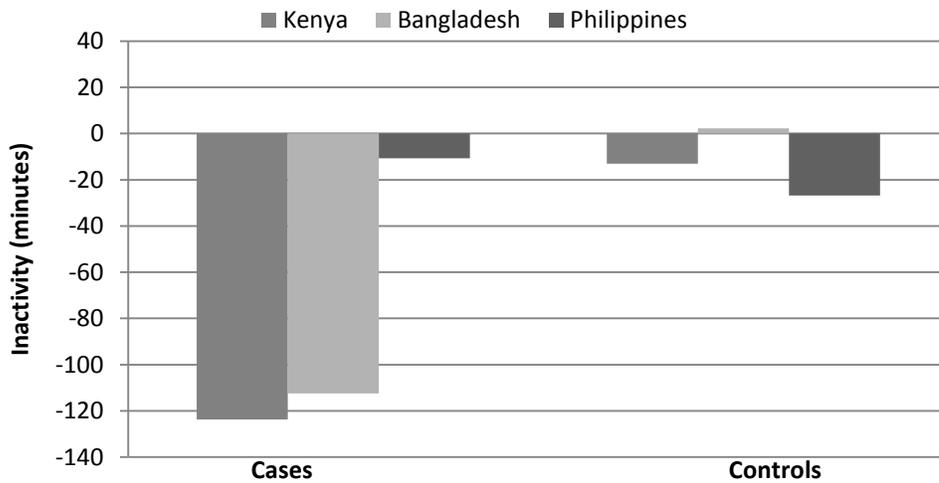


Figure 12: Difference in the amount of time spent (minutes) on a) productive activities and b) inactivity between baseline and follow up among operated cases and controls

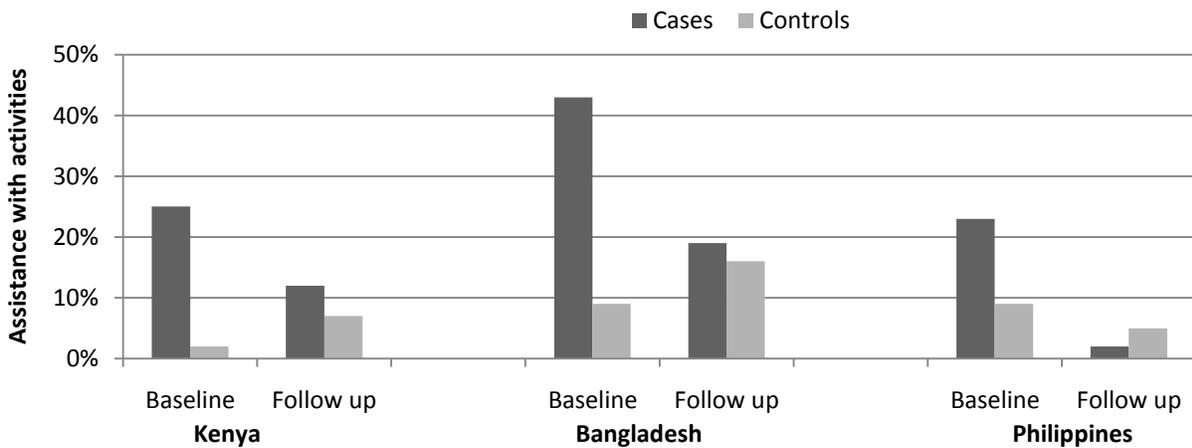


Figure 13: Proportion of operated cases and controls who reported assistance with activities at baseline and follow up

Quality of life

At baseline:

- Cases visually impaired from cataract had substantially poorer VRQoL scores compared to controls (Table 4). In Kenya, for example, the mean score for general functioning was 42.0 for cases and 92.1 for controls. Similarly large differences between cases and controls were observed in Bangladesh and the Philippines.
- Worsening VA among cases was associated with worsening VRQoL scores, but there were no consistent patterns of association with socio-demographic variables.
- Cases also had significantly poorer generic HRQoL compared to controls. Cases were more than four times more likely to report problems with self-care, mobility, usual activities, pain/discomfort and anxiety/depression compared to controls in each country (Figure 14).
- Self-rated health was significantly poorer among cases (Kenya 47.6, Bangladesh 47.2 and the Philippines 51.9) compared to controls (Kenya 59.4, Bangladesh 60.5 and the Philippines 61.6)

- Polack S, Eusebio C, Fletcher A, Foster A, Kuper H. Visual impairment from cataract and health related quality of life: results from a case-control study in the Philippines. *Ophthalmic Epidemiol.* 2010;17:152-9.
- Polack S, Kuper H, Wadud Z, Fletcher A, Foster A. Quality of life and visual impairment from cataract in Satkhira district, Bangladesh. *Br J Ophthalmol.* 2008;92:1026-30.
- Polack S, Kuper H, Mathenge W, Fletcher A, Foster A. Cataract visual impairment and quality of life in a Kenyan population. *Br J Ophthalmol.* 2007;91:927-32.

Table 4: Baseline and follow-up vision related quality of life scores among cases and controls

	Kenya		Bangladesh		The Philippines	
	Baseline Mean (95% CI)	Follow up Mean (95% CI)	Baseline Mean (95% CI)	Follow up Mean (95% CI)	Baseline Mean (95% CI)	Follow up Mean (95% CI)
Overall eyesight						
Cases	24 (21-28)	72 (68-76)	12 (11-18)	70 (65-75)	18 (14-22)	76 (71-80)
Controls	73 (68-78)	75 (70-79)	64 (62-67)	72 (69-75)	67 (63-71)	74 (70-78)
General functioning						
Cases	42 (36-48)	89 (85-92)	15 (1-18)	76 (71-81)	28 (24-33)	85 (81-88)
Controls	92 (90-95)	91 (88-94)	85 (83-88)	80 (78-83)	88 (86-91)	85 (83-88)
Psychosocial						
Cases	55 (48-61)	91 (88-95)	30 (25-34)	82 (79-85)	42 (38-47)	82 (78-86)
Controls	92 (89-95)	91 (88-95)	89 (87-91)	82 (79-85)	87 (84-89)	86 (83-89)

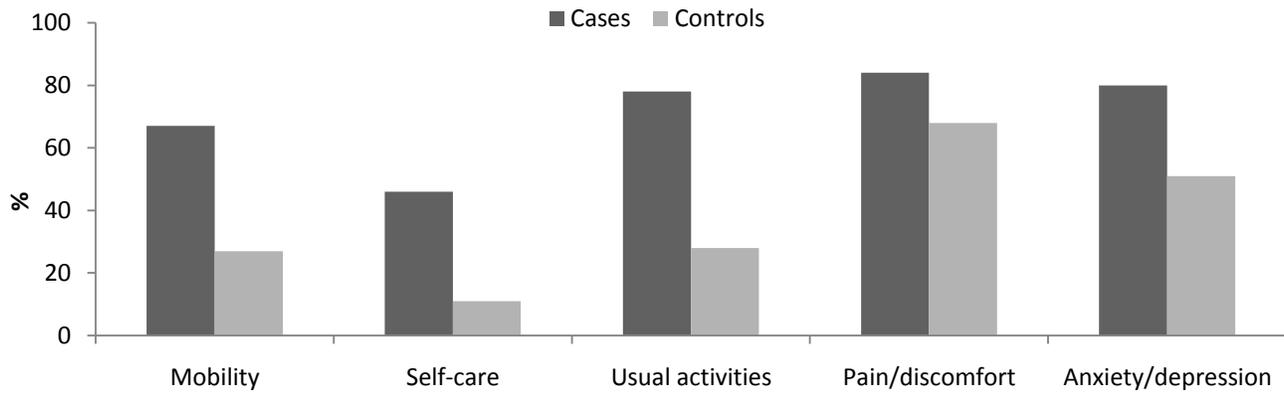


Figure 14: Baseline proportion of cases and controls reporting some/extreme problem in Kenya. Responses were similar in the other two countries

At follow up:

- Among operated cases, mean scores for all VRQoL subscales cases improved substantially compared to baseline (Table 4). For example, in the Philippines mean general functioning scores increased from 28.4 to 84.5. Similar increases were observed in the other two countries.
- Generic HRQoL also improved among operated cases (Figure 15). At follow up, the proportion of operated cases reporting any problem reduced significantly by between 12-44% compared to baseline in all domains in Kenya and the Philippines and 3 of 5 domains in Bangladesh.
- Mean self-rated health scores of operated cases increased from 47.7 to 58.0 in Kenya, from 49.8 to 65.3 in Bangladesh and from 53.3 to 57.7 in the Philippines.
- VRQoL and generic HRQoL scores of operated cases improved to approximately equal those of control subjects.
- VRQoL and generic HRQoL scores of controls stayed relatively stable between baseline and follow up
- Operated cases with a good VA outcome from surgery ($VA \geq 6/18$) had greater improvements in VRQoL compared to those with borderline/poor outcome ($VA < 6/18$).
- The improvement in VRQoL was not dependent on baseline VA.
- People who were operated in both eyes experienced greater VRQoL gains compared to those with unilateral surgery, although this was not always statistically significant.

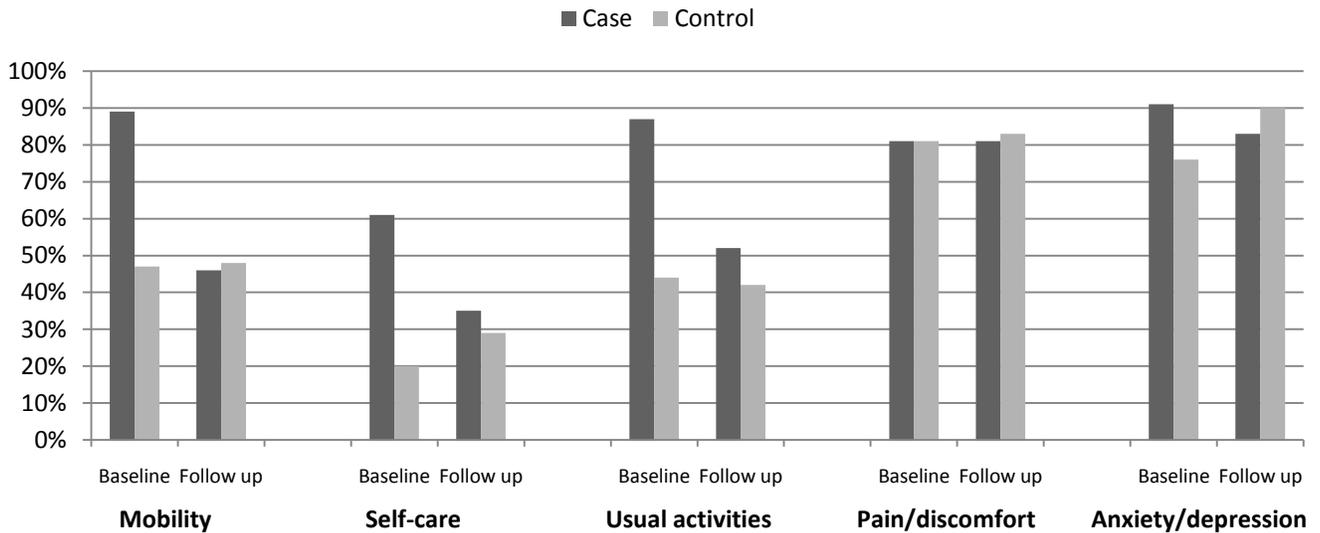


Figure 15: Proportion of operated cases and controls reporting some/extreme problem at baseline and follow up in Bangladesh. Responses were similar in the other two countries

S. Polack, C. Eusebio, W. Mathenge, Z. Wadud, R. Mamunur, A. Fletcher, A. Foster and H. Kuper. The Impact of Cataract Surgery on health related quality of life in Kenya, Bangladesh and The Philippines. *Ophthalmic Epidemiology*. Accepted for publication.

Semi-structured interviews

The semi-structured interviews explored impact of cataract surgery on people’s lives. Key themes that emerged from the interviews are illustrated in Figure 16

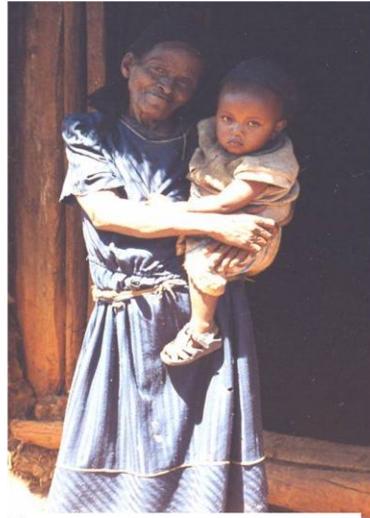
Polack, S. 2008. Restoring sight: how cataract surgery improves the lives of older adults. *Community Eye Health*. 21:24-5.

Figure 16: Key themes and supportive quotes from semi-structured interviews with operated cases in Kenya and Bangladesh

Engagement in productive activities



"I was able to do my business again making locks and knives to sell. This helped me to get money for my family"



Positive social and economic benefits to household members

"After surgery I completely got back my eyesight but because of my old age cannot do heavy work. But I can help in the household chores, so my family can concentrate on earning money."

"The family are happy because we are able to attend other duties now that she is independent. We are able to go about our duties without worry or hurrying back to the house to attend to her."

Independence



"Now I can walk around without asking for assistance. I can have my own mind and do my own thing"

Self-esteem and respect from others

"Earlier I used to feel helpless but I am not feeling like that anymore. I am confident now. I can earn my living by house keeping"

"I do not need to depend on anyone. Besides people used to neglect me earlier, but now they respect me very much"



Communication and relationships

"Now when I meet someone in the community I can say hello and genuinely feel I have communicated and I can tell whether people are truly saying hello with a good heart. Before [surgery] I didn't want to talk to people because I didn't know whether to trust if they were being true. It's easier to talk to people now"



Participation in social events



"After surgery I was very happy because I could visit my friends, and attend village meetings, bazaars and functions like weddings."

DISCUSSION

Summary of findings

This study found that after cataract surgery there was a reduction in household poverty, increased engagement in productive activities and improvements in quality of life in three different low-income settings.

At baseline, people with bilateral vision impairment from cataract were poorer, undertook fewer different daily activities and had substantially poorer health related quality of life compared to people with normal vision. The simple low-cost intervention (cataract surgery) then accorded improvements in the household economy, increased engagement in productive activities and improved quality of life. Among the control subjects these measures stayed relatively stable which lends important support to the changes observed among cases being due to cataract surgery rather than any general changes occurring in the population.

Poverty and time-use

In each setting the average per capita household expenditure of operated cases had increased significantly at follow up compared to baseline so that the cases were no longer poorer compared to the controls. A reduction in poverty as measured through asset ownership or self-rated wealth was not consistently observed. However this may not be expected after only one year of follow-up since these are longer term measures of poverty: more time is needed for households to accumulate additional assets or for perceptions of wealth to change. There was also an increase in participation in and time-spent on productive activities among operated cases in each country and this provides a possible route by which the economic gains may have occurred. While this is most obvious for paid work, it may also occur through increases in non-paid productive activities (e.g. household work).²⁴ The reduced need for assistance from others with daily activities evident in this study after surgery may also contribute to this economic impact. These findings were supported by the description of the impact of surgery provided by participants in the semi-structured interviews.

Implications:

- These findings provide empirical support to previous assertions of economic gains from sight restoring cataract surgery, even in this older age group.
- This suggests that successful VISION 2020 programmes may be cost saving and that provision of cataract surgery may contribute towards poverty alleviation.
- The observed increased engagement in different daily activities and the reduced inactivity and need for assistance also have important implications for improvements in well-being.

Quality of life

This study found large improvements in aspects of quality of life one year after cataract surgery. There were improvements in perception of own eyesight, reduced difficulty undertaking everyday activities (general functioning) and reduced frequency of negative psychosocial experiences associated with vision (VRQoL). Operated cases were also less likely to report problems with mobility, self-care, usual activities and anxiety/depression and had higher overall self-rated health at follow up (generic HRQoL). This indicates improvements in the perception of health associated with cataract surgery beyond vision specific experiences alone. The improvements in VRQoL were substantial even at the better levels of pre-operative vision (VA <6/24 and ≥6/60) and there was some suggestion that second eye surgery afforded greater benefits to VRQoL compared to first eye alone. Having a poor VA outcome from surgery was a major constraint to achieving optimal post-operative VRQoL. In Kenya and the Philippines more than a third of poor outcome was preventable through the provision of spectacles, highlighting the importance of refractive services or biometry.

Implications:

- After cataract surgery substantial improvements in aspects of quality of life are evident and vision specific and generic HRQoL is restored to the level of people with normal vision
- Cataract surgery is beneficial at all VA levels <6/24 (bilateral)
- A focus on improving VA outcomes after surgery is important to ensure optimal gain in VRQoL
- Where resources permit, second eye surgery should be advocated

Conclusion

In summary, the cataract impact study highlights some of the key benefits of cataract surgery to a population of older adults in low-income countries. The findings provide empirical evidence of improved health related quality of life and increased involvement in different daily activities. The findings also support arguments of economic benefit from surgery.

References

1. Resnikoff S, Pascolini D, Mariotti SP, Pokharel GP. Global magnitude of visual impairment caused by uncorrected refractive errors in 2004. *Bull World Health Organ* 2008;86(1):63-70.
2. Shamanna BR, Dandona L, Rao GN. Economic burden of blindness in India. *Indian J Ophthalmol* 1998;46(3):169-72.
3. Frick KD, Foster A. The magnitude and cost of global blindness: an increasing problem that can be alleviated. *Am J Ophthalmol* 2003;135(4):471-6.
4. Smith AF, Smith JG. The economic burden of global blindness: a price too high! *Br J Ophthalmol* 1996;80(4):276-7.
5. Gilbert CE, Shah SP, Jadoon MZ, et al. Poverty and blindness in Pakistan: results from the Pakistan national blindness and visual impairment survey. *Bmj* 2008;336(7634):29-32.
6. Steinkamp MW, Kelly JR. Social integration, leisure activity, and life satisfaction in older adults: activity theory revisited. *Int J Aging Hum Dev* 1987;25(4):293-307.
7. Menec VH. The relation between everyday activities and successful aging: a 6-year longitudinal study. *J Gerontol B Psychol Sci Soc Sci* 2003;58(2):S74-82.
8. Hawkins BA. Aging well: toward a way of life for all people. *Prev Chronic Dis* 2005;2(3):A03.
9. Desai P, Reidy A, Minassian DC, Vafidis G, Bolger J. Gains from cataract surgery: visual function and quality of life. *Br J Ophthalmol* 1996;80(10):868-73.
10. Jayamanne DGR, Allen ED, Wood CM, Currie S. Correlation between early, measurable improvement in quality of life and speed of visual rehabilitation after phacoemulsification. *J Cataract Refract Surg* 1999;25:1135-1139.
11. Owsley C, McGwin G, Jr., Scilley K, Meek GC, Seker D, Dyer A. Impact of cataract surgery on health-related quality of life in nursing home residents. *Br J Ophthalmol* 2007;91(10):1359-63.
12. Rasanen P, Krootila K, Sintonen H, et al. Cost-utility of routine cataract surgery. *Health Qual Life Outcomes* 2006;4:74.
13. Chandrasekaran S, Wang JJ, Rochtchina E, Mitchell P. Change in health-related quality of life after cataract surgery in a population-based sample. *Eye* 2007.
14. Gupta SK, Viswanath K, Thulasiraj RD, et al. The Development of the Indian Vision Function Questionnaire (IND-VFQ): field testing and psychometric evaluation. *Br J Ophthalmol* 2005;89(5):621-627.
15. Fletcher A, Vijaykumar V, Selvaraj S, Thulasiraj RD, Ellwein LB. The Madurai Intraocular Lens Study. III: Visual functioning and quality of life outcomes. *Am J Ophthalmol* 1998;125(1):26-35.
16. Wadud Z, Kuper H, Polack S, et al. Rapid Assessment of Avoidable Blindness and Needs Assessment of Cataract Surgical Services in Satkhira District, Bangladesh. *Br J Ophthalmol* 2006;90 (10):1225-9.
17. Mathenge W, Kuper H, Polack S, et al. Rapid Assessment of Avoidable Blindness in Nakuru District, Kenya. *Ophthalmology* 2007;114(3):599-605.
18. Eusebio C, Kuper H, Polack S, et al. Rapid assessment of avoidable blindness in Negros Island and Antique District, Philippines. *Br J Ophthalmol* 2007;91(12):1588-92.
19. Grosh M, Glewwe P, eds. Designing household survey questionnaires for developing countries. Lessons from 15 years of the living standards measurement study. . Washington, D.C.: World Bank, 2000.
20. Harvey AS, Taylor ME. Time Use. In: Grosh M, Glewwe P, eds. Designing household survey questionnaires for developing countries. Lessons from 15 years of the Living Standards Measurement Study. Washington: The World Bank, 2000: 249-275.
21. WHO. Consultation on development of standards for characterization of vision loss and visual functioning. Geneva: World Health Organization, 2003.
22. Rabin R, de Charro F. EQ-5D: a measure of health status from the EuroQol Group. *Ann Med* 2001;33(5):337-43.
23. Kuper H, Polack S, Limburg H. Rapid assessment of avoidable blindness. *Community Eye Health* 2006;19(60):68-9.
24. UNDP. Human Development Report. Chapter 4: Valuing women's work: UNDP, 1995: 87-98.

References published through the Cataract Impact Study

1. Eusebio C, Kuper H, Polack S, Enconado J, Tongson N, Dionio D, Dumdum A, Limburg H, Foster A. Rapid assessment of avoidable blindness in Negros Island and Antique District, Philippines. *Br J Ophthalmol*. 2007 Dec;91(12):1588-92.
2. Kuper H, Polack S, Eusebio C, Mathenge W, Wadud Z, Foster A. A case-control study to assess the relationship between poverty and visual impairment from cataract in Kenya, the Philippines, and Bangladesh. *PLoS Med*. 2008 Dec 16;5(12):e244.
3. Kuper H, Polack S, Limburg H. Rapid assessment of avoidable blindness. *Community Eye Health*. 2006 Dec;19(60):68-9.
4. Kuper H, Polack S, Mathenge W, Eusebio C, Wadud Z, Mamunur R, Foster A. Does cataract surgery alleviate poverty? Evidence from a multi-centre intervention study conducted in Kenya, the Philippines and Bangladesh. Submitted *Plos One*
5. Lindfield R, Kuper H, Polack S, Eusebio C, Mathenge W, Wadud Z, Rashid AM, Foster A. Outcome of cataract surgery at one year in Kenya, the Philippines and Bangladesh. *Br J Ophthalmol*. 2009;93:875-80.
6. Mathenge W, Kuper H, Limburg H, Polack S, Onyango O, Nyaga G, Foster A. Rapid assessment of avoidable blindness in Nakuru district, Kenya. *Ophthalmology*. 2007 Mar;114(3):599-605.
7. Polack S, Eusebio C, Fletcher A, Foster A, Kuper H. Visual impairment from cataract and health related quality of life: results from a case-control study in the Philippines. *Ophthalmic Epidemiol*. 2010;17:152-9.
8. Polack S, Eusebio C, Mathenge W, Wadud Z, Rashid M, Foster A, Kuper H. The impact of cataract surgery on activities and time-use: results from a longitudinal study in Kenya, Bangladesh and the Philippines. *PLoS One*. 2010 ;5(6):e10913.
9. Polack S, Kuper H, Eusebio C, Mathenge W, Wadud Z, Foster A. The impact of cataract on time-use: results from a population based case-control study in Kenya, the Philippines and Bangladesh. *Ophthalmic Epidemiol*. 2008;15:372-82.
10. Polack S, Kuper H, Mathenge W, Fletcher A, Foster A. Cataract visual impairment and quality of life in a Kenyan population. *Br J Ophthalmol*. 2007;91:927-32.
11. Polack S, Kuper H, Wadud Z, Fletcher A, Foster A. Quality of life and visual impairment from cataract in Satkhira district, Bangladesh. *Br J Ophthalmol*. 2008;92:1026-30.
12. Polack, S. 2008. Restoring sight: how cataract surgery improves the lives of older adults. *Community Eye Health*. 21:24-5.
13. Polack, S, Eusebio, S., Mathenge, W., Wadud, Z., Mamunur, R., Fletcher, A., Foster, A., Kuper H.. The Impact of Cataract Surgery on health related quality of life in Kenya, Bangladesh and The Philippines. *Ophthalmic Epidemiology*. Accepted for publication.
14. Wadud Z, Kuper H, Polack S, Lindfield R, Akm MR, Choudhury KA, Lindfield T, Limburg H, Foster A. Rapid assessment of avoidable blindness and needs assessment of cataract surgical services in Satkhira District, Bangladesh. *Br J Ophthalmol*. 2006 Oct;90(10):1225-9.