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Title: Economic and emotional impact of cataract surgery on patients by gender in Honduras

Purpose: To explore the economic and mental health changes by gender following cataract surgery in Comayagua, Honduras.

Methods: This was a prospective, cohort survey-based study of 75 patients previously scheduled for cataract surgery in March 2023 in Comayagua, Honduras. Surveys were done in person prior to surgery and by telephone four months following cataract surgery. Economic questions included the Simple Poverty Scorecard tailored to Honduras, questions on work, and the effect of vision impairment on work. Mental health questions included the Patient Health Questionnaire, a 9-question tool used to assess depression, and the Generalized Anxiety Disorder survey, a 7-question instrument used to assess anxiety.

Results: Income group increased in the whole cohort (1.81 to 2.53, $p < 0.005$), among women in the stratified analysis (1.66 to 2.53, $p = 0.001$) and when controlled for age and gender ($\beta = 0.69$, $p < 0.001$). Participants were more likely to be working outside the home following cataract surgery (17% to 37%, $p = 0.03$), an effect seen only in men on the stratified analysis but that remained statistically significant on multivariate analysis (OR 3.47, $p = 0.027$). Anxiety scores increased at follow-up among the whole cohort, among women in the stratified analysis, and when the relationship was controlled for age and gender. A significant proportion of participants (75%) reported that their vision continued to interfere with their ability to work following cataract surgery.

Conclusion: Cataract surgery had the anticipated effects of increasing income and work outside the home. It also had the unanticipated effects of increasing anxiety scores and failing to result in vision that fully facilitates work. These results challenge some of the assumptions about the impact of cataract surgery in the developing world, and they indicate that further research into both the economic and emotional impacts of eye care in this setting is needed.

Conflicts of Interest / Financial Disclosures

None

Introduction:

Vision impairment affected approximately 1.1 billion people worldwide in 2020, and that number is projected to increase to 1.8 billion people by 2050 if current trends in population aging and urbanization continue¹. An overwhelming majority of those with vision impairment live in low- and middle-income countries, and women, rural populations, and ethnic minorities are disproportionately affected¹.

Analyses of trends in vision impairment indicate that it is strongly associated with poverty,^{2,3} though it is unclear whether vision impairment is primarily a cause or result of poverty⁴. Relevant findings include that vision impairment reduces productivity by up to 30%⁵, while cataract surgery to address vision impairment increases participation in income-generating activities⁶, expenditures^{7,8}, and work attendance among caregivers⁹. Cataract surgery has also been shown to be highly cost-effective^{10,11} and associated with meaningful improvements in the quality of life¹² for patients and caregivers.

In addition to poverty, visual impairment is related to other adverse health outcomes². One notable example is a strong association with mental health disorders. Two meta-analyses of mental health and vision impairment indicate that depression and anxiety are present in up to 25% of patients with vision loss^{13,14}. Cataract diagnosis nearly doubles the risk of depression at

¹ GBD 2019 Blindness and Vision Impairment Collaborators on behalf of the Vision Loss Expert Group of the Global Burden of Disease Study (VELG-GBD) Trends in prevalence of blindness and distance and near vision impairment over 30 years: an analysis for the Global Burden of Disease Study. *Lancet Glob Health*. 2021; **9**: e130-e143

² Gilbert, C., Shah, S., Jadoon, M., Bourne, R., Dineen, B., Khan, M., . . . Khan, M. (2008). Poverty and blindness in Pakistan: Results from the Pakistan national blindness and visual impairment survey. *BMJ*, 336(7634), 29-32.

³ 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. doi: 10.1371/journal.pmed.0050244. PMID: 19090614; PMCID: PMC2602716.

⁴ Lewallen S. Poverty and cataract--a deeper look at a complex issue. *PLoS Med*. 2008 Dec 16;5(12):e245. doi: 10.1371/journal.pmed.0050245. PMID: 19090615; PMCID: PMC2602717.

⁵ Marques AP, Ramke J, Cairns J, Butt T, Zhang JH, Muirhead D, Jones I, Tong BAMA, Swenor BK, Faal H, Bourne RRA, Frick KD, Burton MJ. Global economic productivity losses from vision impairment and blindness. *EClinicalMedicine*. 2021 Apr 26;35:100852. doi: 10.1016/j.eclinm.2021.100852. PMID: 33997744; PMCID: PMC8093883.

⁶ Finger RP, Kupitz DG, Fenwick E, Balasubramaniam B, Ramani RV, Holz FG, Gilbert CE. The impact of successful cataract surgery on quality of life, household income and social status in South India. *PLoS One*. 2012;7(8):e44268. doi: 10.1371/journal.pone.0044268. Epub 2012 Aug 31. PMID: 22952945; PMCID: PMC3432104.

⁷ Kuper H, Polack S, Mathenge W, Eusebio C, Wadud Z, Rashid M, Foster A. Does cataract surgery alleviate poverty? Evidence from a multi-centre intervention study conducted in Kenya, the Philippines and Bangladesh. *PLoS One*. 2010 Nov 9;5(11):e15431. doi: 10.1371/journal.pone.0015431. PMID: 21085697; PMCID: PMC2976760.

⁸ Danquah, L., Kuper, H., Eusebio, C., Rashid, M., Bowen, L., Foster, A., & Polack, S. (2014). The Long Term Impact of Cataract Surgery on Quality of Life, Activities and Poverty: Results from a Six Year Longitudinal Study in Bangladesh and the Philippines. *PLoS One*, 9(4), E94140.

⁹ Feeny S, Posso A, McDonald L, Chuyen TTK, Tung ST. Beyond monetary benefits of restoring sight in Vietnam: Evaluating well-being gains from cataract surgery. *PLoS One*. 2018 Feb 12;13(2):e0192774. doi: 10.1371/journal.pone.0192774. PMID: 29432447; PMCID: PMC5809077.

¹⁰ Flessa, S. (2022). Cataract Surgery in Low-Income Countries: A Good Deal. *Healthcare (Basel)*, 10(12), 2580.

¹¹ Lansingh, V.C.; Carter, M.J.; Martens, M. Global cost-effectiveness of cataract surgery. *Ophthalmology* 2007, 114, 1670–1678.

¹² Essue BM, Li Q, Hackett ML, Keay L, Iezzi B, Tran KD, Tan Phuc H, Jan S; VISIONARY Study Team. A multicenter prospective cohort study of quality of life and economic outcomes after cataract surgery in Vietnam: the VISIONARY study. *Ophthalmology*. 2014 Nov;121(11):2138-46. doi: 10.1016/j.ophtha.2014.05.014. Epub 2014 Jul 8. Erratum in: *Ophthalmology*. 2016 Mar;123(3):673. PMID: 25012931.

¹³ Parravano, M., Petri, D., Maurutto, E., Lucenteforte, E., Menchini, F., Lanzetta, P., . . . Virgili, G. (2021). Association Between Visual Impairment and Depression in Patients Attending Eye Clinics: A Meta-analysis. *Archives of Ophthalmology*, 139(7), 753-761.

¹⁴ Zheng Y, Wu X, Lin X, Lin H. The Prevalence of Depression and Depressive Symptoms among Eye Disease Patients: A Systematic Review and Meta-analysis. *Sci Rep*. 2017 Apr 12;7:46453. doi: 10.1038/srep46453. PMID: 28401923; PMCID: PMC5388862.

12-year follow-up¹⁵, and anxiety is more common among those who have visual impairment¹⁶
17.

Gender is an important risk factor for vision impairment, as women are 12% more likely to experience vision impairment when compared with men¹. The World Health Organization recognizes gender as a clear social determinant of health¹⁸, and gender equality is the fifth goal listed in the UN's Sustainable Development Goals¹⁹. Some potential explanations for the association with greater vision impairment include greater life expectancy, greater risk for some eye conditions, and less access to care due to socioeconomic and cultural influences¹.

Approximately 90% of global vision impairment is due to either uncorrected refractive error or cataracts, both treatable causes of disability²⁰. As outlined above, treating vision impairment has potentially significant economic and health impacts⁶⁻¹⁰, but much of the research into the impact of cataract surgery has focused on the developed world.²¹ Quantifying the impact of cataract surgery on individuals, families, and their communities across various geographic and socioeconomic settings is needed in order to motivate the development of effective programs for addressing preventable visual impairment.

This study aims to quantify the economic and emotional impact of cataract surgery by gender on a cohort of patients in a population in Comayagua, Honduras.

Methods:

This was a survey-based prospective cohort study of 75 patients receiving cataract surgery at a clinic serving the poor of Comayagua, Honduras, in March 2023. Participants were recruited from among the patients previously scheduled for cataract surgery, and surgery was performed on all patients regardless of study participation. Ethical permission was obtained before the study, and all the Declaration of Helsinki tenets were followed.

A trained local staff member administered surveys, and an informed consent signature, or thumbprint was obtained from all patients. Patients were included in the study if they had no history of previous cataract surgery, and they were excluded if they did not have a cell phone, a necessary tool for survey completion at four and eight months. Surveys were performed in person before cataract surgery and by phone by the same trained, local staff member at follow-up. Multiple attempts were made to contact each participant at both time points to minimize loss to follow up.

¹⁵ Chen PW, Liu PP, Lin SM, Wang JH, Huang HK, Loh CH. Cataract and the increased risk of depression in general population: a 16-year nationwide population-based longitudinal study. *Sci Rep.* 2020 Aug 7;10(1):13421. doi: 10.1038/s41598-020-70285-7. PMID: 32770101; PMCID: PMC7414888.

¹⁶ Gascoyne B, Jolley E, Penzin S, Ogundimu K, Owoeye F, Schmidt E. Vision impairment and self-reported anxiety and depression in older adults in Nigeria: evidence from a cross-sectional survey in Kogi State. *Int Health.* 2022 Apr 6;14(Suppl 1):i9-i16. doi: 10.1093/inthealth/ihab070. PMID: 35385870; PMCID: PMC8986359.

¹⁷ Demmin, D., & Silverstein, S. (2020). Visual Impairment and Mental Health: Unmet Needs and Treatment Options. *Clinical Ophthalmology* (Auckland, N.Z.), 14, 4229-4251.

¹⁸ <https://www.who.int/publications/i/item/WHO-IER-CSDH-08.1>

¹⁹ United nations development programme. Sustainable development goals. 2015 2030.

²⁰ Burton, M., Ramke, J., Marques, A., et al.. (2021). The Lancet Global Health Commission on Global Eye Health: Vision beyond 2020. *The Lancet Global Health*, 9(4), E489-E551.

²¹ Brown GC, Brown MM, Menezes A, Busbee BG, Lieske HB, Lieske PA. Cataract surgery cost utility revisited in 2012: a new economic paradigm. *Ophthalmology.* 2013 Dec;120(12):2367-2376. doi: 10.1016/j.ophtha.2013.04.030. PMID: 24246824.

Economic status was self-reported and assessed using the Simple Poverty Scorecard²² for Honduras. Scores are out of 100, and survey questions included educational background, head-of-household work status, number of people living in the home, and details about home life (see Appendix 1 for the entire survey.) The score allows consistent estimation of the likelihood that a person falls below the national poverty line, with higher scores indicating increased risk. Additional questions included personal income, personal work status, and subjective perception of whether vision interferes with the ability to work. Anxiety was assessed using the Generalized Anxiety Disorder-7 (GAD-7) instrument²³ validated in Spanish²⁴, and depression was assessed using the Patient Health Questionnaire-9 (PHQ-9)²⁵ instrument validated in Spanish²⁶. Income categories were 1 ≤ 500 Lempiras/month, 2= 500-1999 L/m, 3=2000-3999L/m, 4=4000-5999L/m, 5=6000-7999L/m, 6 ≥ 8000 L/m. The Honduran equivalent of \$1.90 per day defined the income poverty line and included categories 1 and 2. Vision impairment was defined as mild for vision between 20/40 and 20/60, moderate if between 20/70 and 20/160, severe if between 20/200 and 20/400, and blind if worse than 20/400.

Stata (StataCorp, College Station, TX) was used for descriptive statistics and data analysis. As a result of the loss to follow-up and the high risk of response bias in the eight-month follow-up data, the primary analyses included baseline comparisons and a complete case analysis of the four-month follow-up data. Means were compared using a t-test for equality of means at baseline and paired T-tests for repeated measures. Baseline proportions were compared using a chi-squared test for equal proportions and McNemar's test for repeated measures. Mixed effects linear and logistic regression were used to explore continuous and categorical outcomes.

Results:

Of 83 eligible patients, 75 were recruited into the study. At baseline, the average age was 67.1 years, 59% (n=44) were female, and the average vision in the better eye was logMAR 0.85, or approximately 20/150 (see Table 1). Following multiple attempts to contact all participants at both time points, 69% (n=52) of the original cohort completed the survey four months postoperatively, and 41% (n=31) completed the survey eight months post-operatively.

Baseline characteristics of the cohort population and those reached for four-month follow-up were compared to explore response bias associated with age, gender, or socioeconomic status (see Table 1).

²²Schreiner M. Simple Poverty Scorecard® Poverty-Assessment Tool Honduras 2014. <https://simplepovertyscorecard.com/>
Accessed 1.25.2023

²³ Spitzer RL, Kroenke K, Williams JBW, Löwe B. A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7. *Arch Intern Med*. 2006;166(10):1092-1097.

²⁴ García-Campayo J, Zamorano E, Ruiz MA, Pardo A, Pérez-Parámo M, López-Gómez V, Freire O, Rejas J. Cultural adaptation into Spanish of the generalized anxiety disorder-7 (GAD-7) scale as a screening tool. *Health Qual Life Outcomes*. 2010 Jan 20;8:8. doi: 10.1186/1477-7525-8-8. PMID: 20089179; PMCID: PMC2831043.

²⁵ Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001 Sep;16(9):606-13. doi: 10.1046/j.1525-1497.2001.016009606.x. PMID: 11556941; PMCID: PMC1495268.

²⁶ Wulsin L, Somoza E, Heck J. The Feasibility of Using the Spanish PHQ-9 to Screen for Depression in Primary Care in Honduras. *Prim Care Companion J Clin Psychiatry*. 2002 Oct;4(5):191-195. doi: 10.4088/pcc.v04n0504. PMID: 15014707; PMCID: PMC327135.

Table 1. Baseline characteristics of the total cohort as compared to baseline characteristics of participants surveyed at four months

	Baseline (n=75)		4 months (n=52)		p
	Mean	SD	Mean	SD	t-test
Age	67.1	12.0	66.6	13.1	0.82
Simple Poverty Scorecard	54.5	12.7	55.8	13.4	0.57
	% Female		% Female		X ² test
Gender	59%		62%		0.45

Baseline metrics for the complete case analysis by gender are in Table 2. Scores on the Simple Poverty Scorecard (SPSC) at baseline ranged from 28 to 83, with a mean score of 55.8. This translates to a 50.6% likelihood that an individual falls beneath the poverty line. More woman than men reported an income that fell below the poverty line (87% v 65%, p=0.05.) Scores on the PHQ-9 depression screening tool at baseline ranged from 0 to 17 out of a possible 27. The mean score was 6.1, which indicates mild depression. Six individuals had scores indicating moderate depression, and no scores indicated severe depression. Thirteen participants (25%) said that their symptoms of depression made life either very or extremely difficult. Scores on the GAD-7 anxiety screening tool at baseline ranged from 0 to 13 out of a possible 21. The mean score was 3.2, which indicates minimal anxiety. Five participants had scores indicating moderate anxiety, and no scores indicated severe anxiety. Ten participants (19%) said that their symptoms of anxiety made life either very or extremely difficult.

Table 2. Baseline of all metrics by sex.

	Total (n=52)		Females (n=32)		Males (n=20)		t-test
	Mean	SD	Mean	SD	Mean	SD	p
Age	66.6	13.1	65.0	14.8	69.0	9.7	0.30
Log MAR VA in Better eye	0.80	0.67	0.78	0.67	0.84 (n=19)	0.69	0.76
Simple Poverty Score	55.8	13.4	54.3	13.4	58.4	13.0	0.29
Income Group	1.81	1.1	1.66	1.0	2.05	1.2	0.21
PHQ	6.1	4.2	6.3	3.8	5.8	4.9	0.65
GAD	3.2	3.0	2.8	2.8	3.8	3.3	0.27
							X ² test
Work outside the home for pay	17% (n=9)		16% (n=5)		20% (n=4)		0.69
Income below poverty line	79% (n=41)		87% (n=28)		65% (n=13)		0.05
Vision interfering with ability to work	88% (n=46)		88% (n=28)		90% (n=18)		0.78

Table 3 summarizes the differences in 7 outcomes at baseline and four months after cataract surgery, and Table 4 summarizes the same 7 outcomes stratified by sex. Tables 5 and 6 summarize the regression analyses when the relationships were when controlled for age and sex.

Table 3. Comparison of baseline and outcomes at four months (n=52)

	Baseline		4 Month Follow-up		Paired t-test
	Mean	SD	Mean	SD	p
Simple Poverty Scorecard	55.8	12.7	56.1	15.5	0.92
Income Group	1.81	1.1	2.53	1.1	<0.005
PHQ	6.1	4.2	6.0	6.1	0.87
GAD	3.2	3.0	5.6	6.1	<0.005
					McNemar's Test
Work outside the home for pay	17% (n=12)		37% (n=19)		0.03
Income below poverty line	79%(n=41)		56% (n=29)		0.02
Vision interfering with ability to work	88% (n=46)		75% (n=39)		0.14

Table 4. Comparison of baseline and outcomes at 4 months by sex. (n=52)

	Baseline					4 month Follow Up			
	Females (n=32)		Males (n=20)		t-test	Females n=32	Paired t-test	Males n=20	Paired t-test
	Mean	SD	Mean	SD	p	Mean	p	Mean	p
Simple Poverty Scorecard	54.3	13.6	58.3	13.0	0.29	53.2	0.51	60.8	0.70
Income Group	1.66	1.0	2.11	1.2	0.21	2.53	0.001	2.53	0.13
PHQ	6.3	3.8	5.8	4.9	0.65	7.3	0.43	3.8	0.14
GAD	2.8	2.8	3.8	3.3	0.27	6.0	0.004	5.1	0.38
					X² test		McNemar's test		McNemar's test
Work outside the home for pay	16% (n=5)		20% (n=4)		0.69	25% (n=8)	0.51	55% (n=11)	0.04
Income below poverty line	88% (n=28)		65% (n=13)		0.05	53% (n=17)	0.01	60% (n=12)	0.99
Vision interfering with ability to work	88% (n=28)		90% (n=18)		0.78	75% (n=24)	0.34	75% (n=15)	0.45

Table 5. Effect of Cataract Surgery - Linear Regression Models

	β	95% CI	p
Simple Poverty Score	0.23	-4.12, 4.58	0.92
Income Group	0.69	0.33, 1.05	<0.001
PHQ	-0.15	-1.97, 1.66	0.87
GAD	2.42	0.82, 4.03	0.003

1. Mixed effects linear regression controlled for age and sex.

Table 6. Effect of Cataract Surgery - Logistic Regression Models

	OR	95% CI	p
Work outside the home for pay	3.47	1.15, 10.48	0.027
Personal income below poverty line	0.30	0.11, 0.80	0.016
Vision interfering with ability to work	0.39	0.13, 1.12	0.090

1. Mixed effects logistic regression controlled for age and sex.

The SPSC values did not change significantly in the full cohort at the four-month follow-up, and analysis by gender and multivariate analysis did not reveal any differences. Mean income group increased significantly among all participants (1.81 to 2.53, $p < 0.005$), but analysis by gender indicated that the increase was statistically significant only among females (1.66 to 2.53, $p = 0.001$ vs 2.11 to 2.53 $p = 0.13$). The effect remained statistically significant on multivariate analysis ($\beta = 0.69$, $p < 0.001$). The proportion of participants who reported income below the poverty line decreased significantly among the whole cohort (79% to 56%, $p = 0.02$). More women than men at baseline reported income below the poverty line (88% v 65%, $p = 0.05$), and the change in the proportion reporting income below the poverty line was significant only among females (88% to 53% $p = 0.01$ v 65% to 60%, $p = 0.99$). Multivariate analysis indicated that the odds of reporting income below the poverty line dropped by more than two thirds following cataract surgery (OR=0.030, $p = 0.016$.) The proportion of participants working outside the home for pay increased from 17% to 37% ($p = 0.03$) among the whole cohort, but when analyzed by gender, only men showed a statistically significant increase (20% to 55% $p = 0.04$ vs 16% to 25%, $p = 0.51$.) When controlled for age and gender, the effect remained statistically significant, indicating that cataract surgery increased the odds that an individual would be working outside the home for pay by almost 3.5 times (OR=3.47, $p = 0.027$.) A majority of patients reported that vision interfered with their ability to work at baseline (88%), and that proportion did not change significantly at four-month follow-up among the whole cohort (75%, $p = 0.14$). Analysis by gender and multivariate analysis controlling for age and gender did not reveal any effect.

Anxiety scores increased significantly among the whole cohort (3.2 to 5.6, $p=0.005$) indicating a change from 'minimal anxiety' to 'mild anxiety', and both genders showed an increase in anxiety with the effect being statistically significant among women (2.8 to 6.0, $p=0.005$ v. 3.8 to 5.1, $p=0.38$.) Multivariate analysis showed a mean increase of 2.42 points ($p=0.003$) following surgery. The number of participants who reported that their symptoms of anxiety made life difficult or extremely difficult fell from 19% ($n=10$) to 12% ($n=6$). Depression scores for the whole cohort, when analyzed by gender and on multivariate analysis did not change between baseline and follow-up. The number of participants who reported that their symptoms of depression made life difficult or extremely difficult fell from 25% ($n=13$) to 12% ($n=6$).

Discussion:

The goal of this study is to begin to quantify the emotional and economic impact of cataract surgery in this setting and to explore how it varies by gender.

The poverty score, age, and gender of those surveyed at baseline and four months did not differ, indicating that response bias is unlikely to affect the complete case analysis. At baseline, there were no statistically significant differences by sex in age, vision in the better eye, poverty score, income group, depression, or anxiety. The mean depression and anxiety scores indicate that, on average, both the men and women in this population suffered from mild depression and minimal anxiety prior to surgery.

The economic impact of cataract surgery was significant by some measures, and the effect may differ by gender. Poverty score did not change following cataract surgery, either among the whole cohort or when analyzed by gender. The absence of change in this score could indicate that the SPSC is not sensitive to short-term changes in financial status, making a four-month follow-up window too brief to detect an impact on this outcome. Self-reported income increased following cataract surgery, and the increase lifted participants out of poverty in this study. On stratified analysis, these effects were statistically significant only among women. The gender difference in the effect of cataract surgery on income seen here may be partially due to the difference in incomes at baseline. Although mean incomes did not differ in a statistically significant way by gender at baseline, more women than men reported income at baseline that fell below the poverty line prior to surgery. The possibility that cataract surgery has a greater impact on the participants with the lowest incomes could potentially explain this difference in effect. When the relationship was controlled for age and gender, incomes increased, and the odds of living beneath the poverty line following cataract surgery fell by two thirds.

The proportion of participants working outside the home for pay increased, but on stratified analysis, the effect was only statistically significant among men. When the relationship was controlled for both gender and age, a participant was 3.5 times more likely to be working outside the home following cataract surgery.

One notable unexpected finding is that a majority of respondents indicated that their vision continued to interfere with their ability to work four months after cataract surgery. This lack of impact was present in both genders and remained on multivariate analysis. Other eye diseases, such as glaucoma or retinal disease, could explain continued difficulty with vision following cataract surgery, but patients with significant retinal disease are typically excluded from cataract surgery in this setting. Post-operative refractive error may also explain some difficulty with

vision post-operatively. Although the surgeons aim for emmetropia with their intraocular lens choices, A-scans can be difficult on the dense lenses in this setting, and intraocular lens selection may be limited at the time of surgery. Post-operative refractions were not completed, therefore, the authors cannot eliminate this explanation. Another aspect of refractive error that may interfere with the ability to work post-operatively is difficulty only with near vision. Even if emmetropia is achieved, difficulty with near vision may significantly interfere with work. Although simple reading glasses could address this, the patients in this setting may not have access to or understand the value of reading glasses. Continued difficulty with vision following cataract surgery needs further exploration.

Depression scores did not change with cataract surgery, but anxiety levels were seen to increase. Although the effect was significant only among women in the stratified analysis, when the relationship was controlled for both age and gender, there was still a statistically significant increase in anxiety following cataract surgery. This finding is difficult to interpret. The assumption was that, since vision impairment is positively associated with depression and anxiety¹⁶, cataract surgery should decrease measures of both of these disorders. Potential explanations for this finding include response bias, wherein the participants with continued anxiety or depression were more likely to respond to the follow up survey. Other explanations include seasonal differences in a predominantly agricultural area where weather variation and crop difficulties might play a role in levels of anxiety and depression. This finding also needs further exploration.

Weaknesses of the study include how work was defined. The questions asked failed to capture the wide variety of work done within the home by both men and women, underestimating the complete impact of cataract surgery on work and productivity. This study suggests that cataract surgery increases work outside the home, however exploring all forms of productivity, including in-home work, would contribute to a better understanding of productivity changes. Another major weakness of this study is the self-reported nature of economic data. Among other reasons for inaccuracy, a fear that reporting a high income at baseline might result in a financial burden associated with the surgery could have resulted in falsely low-income data at intake and thus falsely high effect measures on follow-up. Other weaknesses of this study include loss of follow-up, and a lack of follow-up eye exams. Strengths of this study include that it is one of the first studies to quantify both the emotional and economic impact of cataract surgery on an individual level in this setting.

Cataract surgery in the developing world is delivered with assumptions regarding its impact. Although these results demonstrate the assumed increases in income and work outside the home, they also challenge the assumption that cataract surgery results in vision that fully facilitates a return to work. They also challenge the assumption that cataract surgery relieves the emotional symptoms associated with vision impairment. Further study of the impact of cataract surgery on economic and emotional well-being in the developing world are needed.