

FINANCIAL BARRIERS TO AND HARDSHIP FROM ACCESSING SERVICES FOR CATARACT IN YUNNAN PROVINCE, CHINA

A Health Financing Study for Seeing is Believing V- Yunnan Project
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INTRODUCTION

Addressing Unmet Need for Cataract Surgery - Increasing The Cataract Surgical Rate in China

Recent analysis provided by the Vision Loss Expert Group of the Global Burden of Disease Study estimated that in 2015, 65.2 million people were blind or experienced moderate or severe vision impairment globally (21.6 million – 138.3 million). Cataract was the leading cause of blindness affecting an estimated 12.6 million people (3.4 – 27.8 million) and the second leading cause of moderate or severe vision impairment affecting a further 52.6 million (18.2 – 106.9 million) (Flaxman et al 2017). In East Asia region, across all ages, cataract caused 42% of blindness in 2015 (32.2% – 52.8%) and 31.5% of moderate and severe vision impairment (24% - 39.3%) among the highest percentages globally. Further, an increase in the number of people blind and moderately to severely visually impaired in the East Asia region due to cataract is expected to rise by 9.9% by 2020, largely due to aging populations.

In China, cataract has been shown to be the leading cause of blindness and vision impairment in numerous studies, causing around two thirds of the burden of blindness and severe vision impairment (Guo et al 2017, Zhang et al 2017, Xiao et al 2015). It is also concerning that in some areas of China prevalence of blindness in females is more than double that of males (Zhang et al 2017).

Whilst it is accepted that target cataract surgical rates (CSRs) must be set in accordance with country need and context, it is widely considered that for large burden countries with higher capacity a CSR of 3000 is a reasonable benchmark. Unfortunately, China has one of the lowest cataract surgery rates (CSR) in Asia with clear disparities across different areas (Zhao et al 2018a). China's most recent documented CSR stands at 1402 in 2015 (IAPB Vision Atlas) though recent studies suggests that this could be significantly higher, up to 2205 in 2017 (Zhao 2018b). What remains clear, is that a significant increase in CSR will be needed to clear China's cataract backlog and keep up with new cases with increasing incidence with age.

Yunnan, the area of our study, is one of its poorest provinces in China and has a total of 26 different recognized ethnic groups, which is among the ethnically most diverse regions not only of China but also of Asia. A population-based, cross-sectional survey aimed to estimate cataract surgical coverage (CSC) in rural China in 2014 showed that the average CSC was 62.7%. However the CSC was 43.4% in Yunnan, which was lowest among all study sties (9 provinces) of China showing the large inequities in China and the high unmet need for cataract surgery in Yunnan province (Zhao et al 2018a). Cataract is becoming a more and more pressing problem particularly among minority ethnic groups with population aging. A 2013 study of the Bai group in Dali, Yunnan, showed cataract causing 53.0% of vision impairment and 64.5% blindness, with half of those with bilateral vision impairment or blindness because of cataract remaining in need of surgery (Shen et al 2013).

Whilst there are supply side constraints to increasing CSR and CSC such as the number and availability of ophthalmologists that perform cataract surgery among others, the demand side also plays a role. Previous studies in rural China show common barriers to uptake of cataract surgery include residual vision meaning elderly men and women don't see the need for surgery, lack of awareness that cataract can be treated and where such surgery is available, knowing someone who had a poor outcomes from surgery, fear of surgery, lack of an available escort to accompany the person to surgery and accessibility of the service (distance and transport) and cost (Li et al 2014; Zhang et al 2011; Yin et al 2009; Zhou et al 2008). Cost regularly appears as one of these top barriers to taking up cataract surgery from the perspective of patients, particularly in rural poorer areas of China (Zhang et al 2011; Li et al 2014).

The Role of Health Financing

The ways eye health services are financed plays a large role in take up of surgery and likelihood of impoverishment from it. One study in rural Southern China showed that free screening and low cost surgery could increase uptake of cataract surgery among women and people with low literacy over a five year period (Baruwa et al 2008). Two randomised control trials conducted in rural China, the only studies included in a recent Cochrane review of increasing access to cataract, whilst showing little impact of counselling and education on uptake, showed that waiver of surgical fees (with or without paid or provided transport) significantly increased uptake of cataract surgery (RR 1.94, 95% CI 1.14 to 3.31) (Ramke et al 2017).

The global momentum towards universal health coverage (UHC) is higher than ever before. Its two main dimensions, 1) increasing coverage of health services for those who need them with sufficient quality for improvement in health outcomes and 2) ensuring people can use those services without be placed in financial hardship from doing so, form the basis for target 3.8.2 in the Sustainable Development Goals (SDGs) and global monitoring on countries' progress toward UHC conducted jointly by the World Health Organisation and The World Bank (WHO / WB, 2015 & 2017). The importance of monitoring these two dimensions together has been stressed, as out of pocket costs and potential financial risks from them, are only incurred by people who use the services. Hence, those for whom cost (and other barriers) actually prevent them from accessing services are picked up in looking at the gaps in access and therefore coverage. Whilst the latter has been looked at to some degree in the eye health sector, the former, financial protection for those using eye health services, has been little addressed. This is important in eye health given its strong relationship with aging and evidence in a number of countries that households with elderly members experienced greater burdens and financial hardship risks from health care out of pocket costs that those without.

Over the past ten years the Chinese government has made large strides in achieving near full population coverage of social health insurance through its three main schemes: -

1. The Urban Employees Basic Medical Insurance (UEBMI) – for people employed in the formal workforce in urban areas where both employer and employee make contributions to the scheme
2. The Urban Residents Basic Medical Insurance (URBMI) – for all others residing in urban areas (who pay on a voluntary contribution basis according to a set contribution schedule)
3. The New Cooperative Medical Scheme (NCMS) – for those in rural areas including significantly agricultural workers as well as other rural residents (who pay on a voluntary contribution basis according to a set contribution schedule)

Those in poverty who are unable to afford the basic medical insurance premium or the OOP payments of medical insurance are subsidized by an urban and rural medical assistance system (medical financial assistance or MFA), which provides a safety net to promote the access of poor people to basic health care. Its effectiveness providing financial risk protection for these households however, is questionable (Liu et al, 2017). In Yunnan province the merged URBMI & NCMS had more than 98% coverage of its target population in 2017 and arrangements for MFA were in place (data collection as part of our study).

Whilst coverage of social health insurance is high in China, this has not been accompanied by a reduction in out of pocket costs to patients and their risk of impoverishment from paying for health care, particularly important in rural poorer provinces such as Yunnan. The recent UHC global monitoring report showed that despite its high coverage of health insurance and services, it also had one of the highest rates of poverty from paying for health care globally with over 2% of households falling into extreme poverty from health care out of pocket payments (WHO & World Bank 2017; Wagstaff et al 2018). In addition, China's ranking amongst the highest performers on an overall index of health service coverage measured across sixteen key areas (Hogan et al 2018) is not matched by its relative performance on cataract surgical rates

or coverage, suggesting that eye health is an area falling behind average coverage of services in the country.

Health financing arrangements under China's previous NCMS and now newly merged NCMS & URBMI, such as lack of reimbursement for outpatient costs (supported rather through individual contributions to medical savings accounts held alongside the basic medical insurance), policies for reimbursement levels for consumables, and lowered reimbursement ratios for higher levels of care, among other policies, all have key implications for eye care services. How these all play out in terms of financial access to and financial protection in use of eye health services (focussing here on cataract surgery and to a lesser degree, DR) has been little explored. Our study seeks to address this gap and particularly implications and consequences for poorer rural populations in China using the example of four counties across two prefectures of Yunnan province.

STUDY OVERVIEW

Aims and Objectives

In the context of Universal Health Coverage including for eye care, the Yunnan eye health financing study aimed to explore the financing related barriers (along with other) to service use and financial protection in eye health (particularly cataract surgery) a drawing out implications for further ensuring access to needed eye care services and protecting already poor populations from further risk of financial hardship and impoverishment through paying for eye health care. This included specific objectives to:

- 1) Investigate and describe the financing, pooling, purchasing and provision aspects of the NCMS and URBMI and how these may relate to particularly to access and equity but also efficiency and effectiveness in eye health services (primarily cataract surgery but also DR)
- 2) Investigate barriers to access to services from the patient perspective for people in need of eye health care (particularly cataract services) and draw out those that might be addressed through financing arrangements
- 3) Assess the proportionate burden of the cost of cataract surgery being placed on the patient and potential consequences for financial protection
- 4) Provide options for financing arrangements as insurance schemes are merged that might balance maximising efficiency to payers, sustainability to providers and equity in access and financial protection for patients.

Study Setting

The study took place in two counties in each of Wenshan prefecture (Yanshan & Qubei counties) and Dali Prefecture (Binchuan & Nanjian counties) in Yunnan province.

The rural medical insurance NCMS is the most prominent in Yunnan province covering 76% of the population and over 97% NCMS target population in the study counties. We therefore focus on NCMS (now merged NCMS and URBMI) arrangements and their relationship with both financial access to and hardship from cataract surgery across the four counties and two prefectures. Arrangements for both URBMI and NCMS vary by county and therefore form a type of natural observational study to see how different arrangement impacts cataract access and out of pocket cost in the relevant counties.

Approach to the Work

Phase 1 of the work involved a review of health insurance arrangements at the province, prefecture and county level for the years 2013 – 2017 to depict the potential implications of changes in policy over this

period on cataract uptake and potential financial barriers and burdens. Key informant interviews were undertaken with a range of officials from the health insurance office of provincial/prefectural/county health bureau, managers of health insurance offices in the pilot hospitals and health professionals from the study hospital eye departments. This included general health insurance arrangements as well as cost and financing specific to cataract surgery.

Table 1: Numbers of key informant interviews by respondent type (phase 1)

	County level	Prefecture level	Provincial level	Total
Eye health care professionals	11	7	5	23
Finance / health insurance administrators	8	4	2	14
Eye care patients and their escorts	32	15	0	47
Total	51	26	7	84

Phase 2 of the work included 212 telephone interviews with patients diagnosed with cataract up to and including May 2018. Two sample frames, one of eye screenings and those diagnosed with cataract, and the other patients undertaking cataract surgery, at study sites during the periods of interest. These were used to obtain 50% sample of individuals having had cataract surgery in one or both eyes and 50% sample of those diagnosed with cataract but who have not had surgery (hence the sample of 212 interviews is made up of 106 not having had surgery and 106 having had surgery).

A purpose designed interview questionnaire was developed as part of this study to give rapid but useful information regarding access, particularly financial, to surgery and estimated out of pocket cost from surgery where obtained, and the burden this placed on households in the two prefectures in Yunnan. Items included indicators of socioeconomic status, household membership, health insurance and details of cataract diagnosis. It then included, for those having had surgery, details of the place of surgery and reasons for this choice, out of pocket costs and how they funded these costs as well as patient perspective on the level of out of pocket payment for surgery relative to expectations. For those not having had surgery the interview explored reasons for not taking up surgery including what cost expectations the patient had and where they were most likely to get information from.

A selection of questions from the expert based simple poverty scorecard for China (Schreiner 2012) were used in the telephone interview instrument to allow construction of socioeconomic quartiles from resulting scores. Not all questions could be used however, given the need to consider length of interview. In addition, despite the scorecard questions being designed for rural areas of China, some questions used did not adequately distinguish between households in our study areas of Yunnan. This included, for example, fuel used for cooking where 87.3% of households in our sample used electricity.

Table 2 shows the resulting poverty quartiles by study area based on the specific simplified socioeconomic score resulting. It must be noted that given the underlying poverty scores are ordinal, not cardinal, it cannot be said that someone in quartile 3 is on average 3 times wealthier than those in quartile 1 – it simply reflects the percentage of the sample cumulatively across categories in ascending order of wealth – aligning to 25% (in fact 22.8%), 50%, 75% and 100%.

Table 2: Socioeconomic score group by county in the sample across those having had and not had surgery

	n	1 (poorest)	2	3	4 (wealthiest)
Wenshan – prefecture capital area	24	29.2%	20.8%	12.5%	37.5%
Yanshan	39	15.4%	41.0%	28.2%	15.4%
Quibei	44	34.1%	34.1%	18.2%	13.6%
Dali – prefecture capital area	40	12.5%	20.0%	35.0%	32.5%
Binchuan	30	16.7%	16.7%	30.0%	36.7%
Nanjiang	33	21.2%	30.3%	27.3%	21.2%
Overall sample*	210	22.2%	27.8%	25.5%	24.5%

*Note that this excludes 2 people from a county in Wenshan prefecture but outside the study counties

It must be considered that these levels of socioeconomic status are relative to each other in the sample within Yunnan province, known to be one of the relatively poorer off in China, and not respective to the Chinese population overall. From this it can be seen that across the study areas households in Qiubei were relatively poorer and households in the more urban populated areas of Wenshan and Dali prefecture capital area relatively better off along with those in Binchuan county.

Table 3 below presents the characteristics of the sample overall and by those having had and not yet taking up surgery. As expected the vast majority of the sample are over 50 with just over 85% of the sample, in fact, over 60 years of age. Given these older ages and being a rural, higher poverty province, over 80% (83.5%) have no or primary schooling over a quarter of the sample (28.3%) having no schooling. Three quarters of the sample are engaged primarily in unpaid work outside the home, most likely agriculture. Many of those interviewed, however, were women (60.8%) in older age groups who may be more expected to be working in unpaid agriculture. However, 77% of the entire sample interviewed suggested that there were 1 or more and in fact 68% saying 2 or more members of the household who had stable income other than from agriculture. Health insurance status mirrored that of the province overall where over 98% had health insurance the vast majority of whom were covered by the NCMS (92.9%).

Table 3: Baseline characteristics of the telephone interview sample – by having had and not had surgery

	No surgery	Had surgery	Overall
Area			
• Wenshan – prefecture capital area	8.2%	12.3%	10.3%
• Yanshan			
• Quibei	16.5%	18.9%	17.7%
• Wenshan – other county	20.6%	20.8%	20.7%
• Dali – prefecture capital area			
• Binchuan	1%	1%	1%
• Nanjiang	21.6%	17.9%	19.7%
	14.4%	15.1%	14.8%
	17.5%	14.2%	15.8%
Sex			
• Male	38.1%	39.6%	38.9%
• Female	61.9%	60.4%	61.1%
Age			

<ul style="list-style-type: none"> • < 40 • 40 – 49 • 50 – 59 • 60 – 69 • 70 + 	2.1%	0.9%	1.5%
	3.1%	0.9%	2.0%
	12.4%	11.3%	11.8%
	42.3%	37.7%	39.9%
	40.2%	49.1%	44.8%
Education			
<ul style="list-style-type: none"> • No formal education • Primary schooling • Secondary schooling • Tertiary education 	32.0%	22.9%	27.2%
	48.5%	62.9%	55.9%
	17.5%	12.4%	14.9%
	2.1%	1.9%	2.0%
Poverty status			
<ul style="list-style-type: none"> • Quartile 1 (poorest) • Quartile 2 • Quartile 3 • Quartile 4 (wealthiest) 	23.7%	19.9%	21.7%
	27.8%	27.4%	27.6%
	23.7%	28.3%	26.1%
	24.7%	24.5%	24.6%
Year of cataract diagnosis			
<ul style="list-style-type: none"> • Pre 2015 • 2015 • 2016 • 2017 • 2018 	3.2%	9.4%	6.5%
	5.3%	9.4%	7.5%
	22.1%	31.1%	26.9%
	62.1%	39.6%	50.2%
	7.4%	10.4%	9.0%

60% of the sample had their cataract diagnosis in 2017 or later and this has impacted the likelihood of having had cataract surgery given the frequent delay between diagnosis and accepting surgery. This can be seen where a higher proportion of those having had surgery had a diagnosis in earlier years. Hence time since diagnosis was included in the regression exploring likelihood of surgery. Another 27% were diagnosed in 2016 with the remaining 7% in 2015 and the remaining 6% prior to 2015.

Data from the telephone interviews was entered in Microsoft Excel by two research assistants from Kunming Medical University and translated into SPSS and Stata by the Fred Hollows Foundation. Descriptive analysis was undertaken in SPSS version 25 and the econometric analysis in Stata version 15. For the latter, a binary logistic regression model that accounted for clustering at the area level was constructed that included fixed effects for county, along with other explanatories relating to demographic, socioeconomic and expectations of surgery and its cost.

KEY RESULTS

Overview of Key Health Insurance Arrangements in Yunnan Province

In general, the proportion of contribution for health insurance paid by the patient versus government subsidy is increasing over time in Yunnan province, particularly in Wenshan prefecture under NCMS / URBMI. The level of required co-payment (or deductible) also increased over time – both placing additional financial pressures on households.

However, in later years of the study, a number of counties put in place specific arrangements to reduce out of pocket costs for households registered by the Bureau of Civil Affairs as particularly poor or from other disadvantaged groups.

Arrangements under the NCMS/URBMI scheme varied significantly across the counties and years of the study. Very complex rules rapidly changing on caps, proportion of charges reimburse for first, second and third hospital stays and whether a patient is from within or outside of the area and policies on reimbursement of bed days and consumables mean that patients are generally not aware on what they are entitled to have covered and what they need to pay, leaving room for unnecessary out of pocket expenses being incurred, including for eye health.

Key Issues in Health Financing with Implications for Eye Health

Lower reimbursement at higher levels of care

In addition to a higher co-payment / deductible, the proportion of total expenses covered under the NCMS and URBMI schemes are higher at lower levels of care with up to 90% at primary medical institutions, up to 75% at secondary medical institutions and around 50% at tertiary institutions.

In reality, however, actual reimbursement ratios are at least lower than this policy quoted ration under the NCMS & URBMI (now merged) schemes due to complex arrangements including caps on claims payable for an individual both on an annual basis, hence substantial out of pocket costs are still incurred for patients. In 2016 average costs reimbursed as a proportion of total in Yunnan province were around

- 43% for a provincial hospital;
- 50% for a prefecture level hospital
- 65% for a county hospital and
- 77% for a township hospital

Whilst this trend across levels of care can incentivise appropriate use of lower levels of care versus self-referral to higher levels of care, increasing costs to the health system, it does mean that patients requiring surgical services and other services only available at higher levels of care are particularly susceptible to incurring catastrophic levels of out of pocket health expenses, lowering financial protection. This has particular implications for eye health where cataract surgery can only be conducted at county hospital level upwards and for DR treatment which can only be provided at the prefecture level hospital and above.

Table 4: Out of pocket cost for cataract surgery across three hospital types in Yunnan

HOSPITAL TYPE	n	Mean (Yuan)	SD (Yuan)	Mean (USD)	SD (USD)
County hospital	71	1,719	1,850	240.64	259.04

Prefecture hospital	22	3,677	2,358	514.82	330.08
Other hospital	13	4,589	3,680	642.49	515.16

Two thirds of the cataract surgeries in our study sample took place at county hospital level (67%) another 21% at prefecture hospitals and the remaining 12% at other hospitals (often higher level specialist hospitals). Out of pocket cost trends across these illustrate the concerns above, summarised in table 4, however whilst the pattern is important, the figures should be interpreted with caution. It is possible that more complicated cases go to higher level hospitals, for example, and this may reasonably account for some of the different in out of pocket cost.

Exclusion of most outpatient services from coverage

A further concern for the level of out of pocket costs paid by patients for eye health is that outpatient services are rarely covered under NCMS / URBMI. Outpatient charges are generally paid through an individual medical savings account of the patient, attached to the insurance. In such accounts only amounts put in by the patient can later be used to support outpatient payments required by the patient. These are essentially not then “covered” by the scheme as patient pays the full charges, whether it be in advance (through the savings account) or at time of care (point of service out of pocket). Under NCMS, according to the policy, outpatient cost in local village and township clinic can be reimbursed with per visit, per month and per annual caps. Value of the cap various in different places. The national guidance is to cover around 50% OPD cost for NCMS patients in local village and township. But the actual reimbursement rate may also vary a lot.

Firstly, eye health screenings generally occur in an outpatient setting. Whilst the Chinese government does have a basic health service package that includes eye screening to take place at a village and township level, this rarely takes place currently. Outside of the Fred Hollows program areas, diagnostic tests for eye health (cataract, DR, etc) are generally performed at an outpatient department of a hospital and hence would only be paid from the medical savings account of the patient.

Data from the telephone interviews illustrated this with only one fifth of diagnoses (20.3%) occurring at lower levels of the system such as township clinics and the remaining occurring at prefecture and county hospital level. This has implications for higher out of pocket costs due to lower proportionate reimbursement at higher levels of care (noted above), as well as the lack of coverage of outpatient based diagnostic services in NCMS. Where screening will be included under inpatient costs if the person goes on to have surgery in the same visit, this is rare with the data showing a time lag between diagnosis and surgery.

This has a two key implications. Firstly, costs are effectively being incurred by the patient increasing out of pocket costs and lowering financial protection. Secondly patients rarely know the balance of their medical savings account before reaching the health facility. One prefecture hospital interviewed stated that for DR services (provided in an outpatient setting) patients would sometimes come all the way to the prefecture hospital (being only provided at this level) only to find out that they had an insufficient balance in their medical savings account to pay for treatment. Where the patient returned home without treatment, the likelihood of them returning is lessened, lowering coverage of needed DR treatment. Where the patient then chooses to pay on the spot out of pocket, the likelihood that this places additional financial burden on them is heightened lowering financial protection. In either case, universal coverage of eye health services is reduced.

Where providers choose to deliver services in an inpatient setting therefore, to ensure greater financial access for patients that could more cost efficiently be provided in an outpatient setting, this further increases an already high rate of cost escalation in the Chinese health system.

Cost and reimbursement of intra-ocular lenses

Whilst policies on reimbursement for consumables vary from county to county at a maximum (applicable to most counties) domestic consumables are reimbursed but imported consumables up to an amount of 1000 Yuan (\$US 140) are reimbursed at around 70% of cost (hence 700 Yuan). Therefore, for any imported consumable (such as IOL) over Yuan 1000 a maximum of 700 Yuan (\$US 98) will be reimbursed and the patient pays the remainder out of pocket. A domestic IOL ranging from 200 to 350 Yuan will be fully reimbursed. (US\$28-49) In one county a maximum of 200 Yuan for domestic or imported consumables will be reimbursed, raising potential out of pocket costs to the patient.

Data collected from the hospitals, again varying by hospital, however showed that IOL charges range from 156 to nearly 10,000 Yuan (US\$22-US\$1,400). The IOLs most frequently used ranged between 1500 and 3500 Yuan with an average charge of Yuan 2919 across prefecture hospitals and 1765 across county hospitals, meaning an average out of pocket payment of minimum 2219 across prefecture level hospitals and 1065 at county level hospitals.

Whilst IOLs are, in theory, decided through patient choice after being provided information by the ophthalmologist or other eye health professional, the problem of agency occurs. Incentives created by higher margins and other benefits arising from imported IOLs being used creates the risk that patients could be led toward higher priced IOLs without increases in quality or patient outcomes. In addition, in one county hospital visited the domestic IOL was not available with the cheapest IOL available being 1500 Yuan (unfortunately the same county where maximum reimbursement was Yuan 200) meaning a minimum out of pocket cost to the patient at that time of Yuan 1300.

Changes to inpatient days reimbursed

Recognising growing costs of cataract surgery to the NCMS / URBMI scheme the Province recently introduced a cap on the number of inpatient days reimbursed by the scheme for cataract surgery to two days, Additional days in hospital likely being at the cost of the patient, this too will increase out of pocket costs for cataract surgery.

Data from the 106 patients interviewed by telephone who had cataract surgery showed 56% stayed 1 – 2 days in hospital for their cataract surgery nearly half (44%) stayed for three days or more (20% - 3 days; 2% 4 days and 20% 5 days or more). Higher lengths of stay were more common at prefecture level hospitals than county. Whilst this may be reasonable given potential for more complicated cases at prefecture hospital level and that patients likely travelled further, this is also likely to further increase patient out of pocket costs resulting given lower reimbursement proportions at higher levels of care described earlier.

This was played out in the data with patient having higher lengths of stay (defined as more than 3 days) having higher out of pocket costs of surgery. Controlling for hospital type, given the link between length of stay and hospital type as noted above, higher lengths of stay were associated with US\$210 greater median out of pocket cost at prefecture level hospitals and an additional US\$95 at county level hospitals. Again this has to be interpreted with caution as this could relate to severity of cataract, which is not data available to the study team.

Experience and Burden From Out of Pocket Costs for Cataract Surgery

Overall by prefecture, cataract surgical patients in Wenshan and Dali prefectures experienced similar out of pocket costs from cataract surgery at a median of \$280 across both prefectures when all places of surgery are included.

This disguises significant variation within prefectures, however, where one of the study prefecture hospital had a median out of pocket cost of nearly double that of the other study hospital at the prefecture level. In addition county hospitals showed significant variation with one hospital in each county showing median out of pocket costs US\$200 – US\$250 higher than the other. Greater use of phacoemulsification surgery versus small incision (the former associated with higher cost) and the availability of lower cost IOLs were the primary drivers for these differences and, to a lesser extent, county level reimbursement arrangements.

It must be noted that these figures are based on relatively small sample sizes once we get to hospital level (between 12 and 22 cataract surgical patients only) and are based on a rapid method of asking overall out of pocket cost and hence, not as robust methodology as household survey outlining different components of cost and comparing this with an overall estimate. Further work on this is planned using appropriate household surveys, which will also act to validate rapid telephone interview methodology used here to explore financial barriers to and burden from cataract surgery (see limitations and next steps sections at the end of this report).

Potential burden of out of pocket cost

Using data on average per capital incomes from county level Statistical Communique of the National Economics and Social Development committees for 2016 the out of pocket costs from cataract surgery in the study counties represent between 2% and 8.5% of an urban resident’s annual income and between 6% and 25% of a rural residents’ annual income, an extraordinarily high proportion.

Table 5 below also shows there is also very little difference in median out of pocket cataract surgical cost across sample calculated poverty quartiles (see approach section above) until you reach the wealthiest quartile. This indicates the relatively higher out of pocket burden from cataract surgery likely to be experienced by those more socioeconomically disadvantaged.

Table 5: Median out of pocket cost of cataract surgery across sample estimated simple poverty quartiles

Poverty quartile	Median OOP (Yuan)	Mean (SE) (Yuan)	Median OOP (US Dollar)	Mean (SE) (US Dollar)
Quartile 1 (poorest)	2000	2517 (641)	\$280	\$352 (90)
Quartile 2	1500	2010 (407)	\$210	\$281 (57)
Quartile 3	1825	2724 (508)	\$255	\$381 (71)
Quartile 4 (wealthiest)	2300	2682 (410)	\$322	\$376 (57)

This is evident in table 6, which shows the far greater proportion of patients in the poorest quartile reporting difficulties with paying for their cataract surgery.

Table 6: Difficulty with paying according to poverty quartile

Poverty quartile	Not difficult	Just manageable	Somewhat difficult	Very difficult
Quartile 1 (poorest)	4.8%	14.3%	47.6%	33.3%
Quartile 2	13.8%	41.4%	37.9%	6.9%
Quartile 3	26.7%	26.7%	43.3%	3.3%
Quartile 4 (wealthiest)	42.3%	34.6%	3.8%	19.2%
Overall	22.6%	30.2%	30.2%	14.2%

This translates to an even more worrying trend seen in table 7, where nearly half of those (47.6%) in the poorest quartile, had to borrow money or sell assets to pay for their cataract surgery. This is an important indicator frequently used in examining out of pocket health care cost burden, as it can lead to even further impoverishment of household over a long period from loss of resilience (through selling of assets) or further debt burden incurred.

Table 7: Proportion of sample who borrowed money or sold assets to pay for cataract surgery by poverty quartiles

Poverty quartile	Borrowed / sold assets
Quartile 1 (poorest)	47.6%
Quartile 2	10.7%
Quartile 3	11.5%
Quartile 4 (wealthiest)	20.0%
Overall	21.0%

The slightly upwards turn in proportion of wealthiest quartile borrowing money or selling assets to pay for surgery is not as unusual as it might first seem, where those who are wealthier have greater disposable assets or greater access to quick loans from relatives who also tend to be better off.

Cost in Relation to Other Determinants of Cataract Surgery Uptake

Despite the above the overwhelming barrier to surgery was not perceiving the need for it (50% of those not having had surgery) with the second highest reasons being fear of the surgery itself (15.1%). Only 9% said cost expectations were a barrier (though this was the third highest reason). Given the high burden of out of pocket cost shown above, however, this could be because populations are used to these high costs (known to occur across the health system) or because cost if not well known up front.

This hypothesis is supported by reported cost expectations of patients who have not yet had cataract surgery. Over a third of those diagnosed as needing surgery suggested that did not know the level of cost they expected (35.8%) and over half (51.9%) suggested they expected the cost to be less than 1500 Yuan, which as can be seen above, is generally not the case.

For those having had surgery, many (43%) chose their place of surgery based on the recommendation of a friend or family member whether or not that friend or family member had previously had cataract surgery themselves. Another 25% chose the closest facility to where they lived and another 14% were referred there. Price expectation was not a major determinant of choice of facility but this is much more likely to be due to the lack of knowledge on likely cost or even potential range of the charge across facilities. This information is largely not available to patient both because there is no requirement for transparency of this cost – such as advertising it outside facilities or on line. It is also likely due to all the individual financing arrangements that ultimately determine out of pocket cost making it difficult for patients to predict.

DISCUSSION, LIMITATIONS AND FURTHER WORK

Given existing health financing arrangements under the newly merged NCMS / URBMI eye health services represent potentially large out of pocket costs to patients and therefore financial hardship risks, particularly to poorer rural populations of Yunnan. Areas of particular focus to increase financial risk protection may be greater regulation of IOL charges along with standardised information about cataract surgery and IOLs given to patients across the province (giving the patient more information to balance with that provided by the ophthalmologist).

For both reasons of potential coverage, cost efficiency and financial access, inclusion of coverage for outpatient costs for selected services and procedures should be considered. For cataract surgery, for example, the move to outpatient based day surgery has been associated with significant increases in cataract surgical rates and coverage in other countries such as Australia. It also reduces costs to the health system and patient.

Likely out of pocket costs are not predictable to patients given the myriad of factors that go into their variation for cataract surgery and DR services. Hence patients cannot choose to minimise their financial risks through choice of provider. Both a simplification of reimbursement regulations along with greater consistency and transparency in charges would be useful.

Limitations of The Study

Much of the quantitative analysis provided above to date have been based on relatively small numbers when differences between and within areas is to be considered (106 patients having had surgery with between 12 and 22 patients only per area / facility). In addition, given time limitations and concerns regarding participation, a rapid approach to gathering out of pocket cost and financial barrier information was undertaken through telephone interview. This necessitated leaving out core questions such as consumption expenditure and other household experience of and spending on illness known to influence take up of surgery and out of pocket burden. Similarly, the out of pocket cost question was limited to one overall amount rather than listing different aspects of the care pathway and inputs. Such overall estimates are known to tend to underestimate out of pocket costs and so the above estimates of out of pocket cost burden could be considered conservative.

Finally, though part of the protocol, the study team could not collect cost of provision of services at study facilities to date. This will be important to look at ratio of charges to costs of cataract surgery delivery as well as to look at the proportion of the overall cost falling on patients.

Further Work

To address the above limitations, follow up work is planned as a last phase of the project. This will involve face to face household survey in the study areas which will provide more robust estimates of out of pocket burden. Importantly it will also allow consideration of how households prioritise spending on cataract surgery when needed across other household health care needs and the economic burden on households from out of pocket costs. It will also aim to gain greater buy in of local authorities and hospitals as a pathway to estimating costs of cataract and therefore the proportionate cost burden experienced by patients, particularly poorer households, of the overall cost. To date diabetic retinopathy has been little explored due to the small number of cases found at study hospitals at the time the study commenced. The possibilities of looking further at these costs will also be determined in the follow up study now that more cases of DR accessing services have been identified.

All these results outcomes will be linked to financing arrangements by county and prefecture in an aim to inform policy decision making and innovative approaches to policy communication and discussion with government health decision making bodies will be held.

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THANK YOU

Contact details

Debbie Muirhead
dmuirhead@hollows.org

Amanda Huang
yhuang@hollows.org