

# *Bringing light to sight in the Yunnan Province, China*

*The benefits of  
eliminating avoidable  
blindness and visual  
impairment*

*The Fred Hollows  
Foundation*

*Yunnan Province, China  
Country Analysis*

*May 2014*





**For each \$1 invested in the efforts to eliminate avoidable blindness and visual impairment, a return of \$3.16 could be potentially realised in Yunnan Province**

The burden of avoidable blindness and visual impairment affects 223 million individuals directly (Stevens et al, 2013<sup>1</sup>). Eliminating avoidable blindness and visual impairment stands to generate substantial benefits to individuals, their carers and to economies more broadly.

**Key Statistics<sup>2</sup> - Yunnan Province, China**

**Benefit Cost Ratio (BCR) of 3.16**

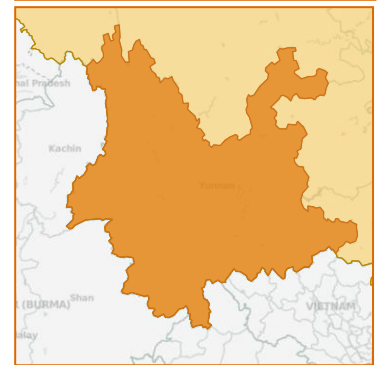
**Population Yunnan 2010:**  
45.6 million

**World Bank Region:**  
East Asia & Pacific (developing)

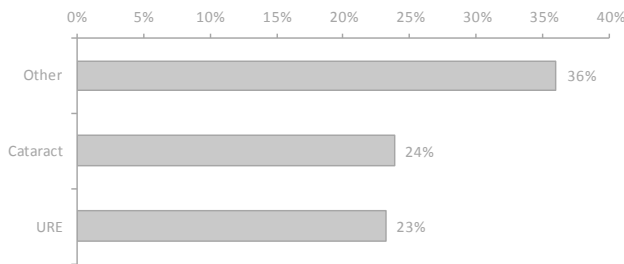
**GNI per capita Yunnan (USD 2010)<sup>3</sup>:** \$2,780

**Prevalence of blind & visually impaired Yunnan:** 1.3 million

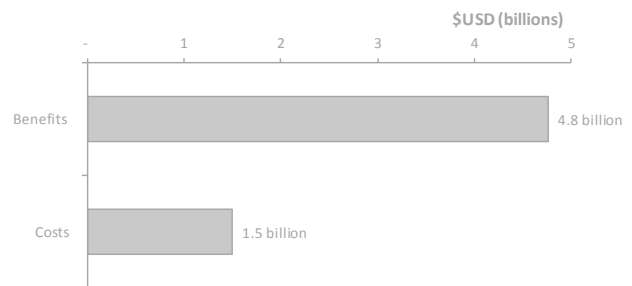
**Income level:**  
Lower middle income



**Main causes of blindness & visual impairment - (Wu et al 2007)<sup>4</sup>:**



**Benefit Vs. Cost**



<sup>1</sup> These revised data are lower than the previous calculations and are based on the WHO 2010 estimates of declining trends in visual impairment and blindness. A large portion of the difference stems from the newer reduced estimate of visual impairment in China. New data were attained from Stevens, 2013, Global Prevalence of Visual Impairment and Blindness.

<sup>2</sup> China country statistics sourced from the World Bank.

<sup>3</sup> [http://www.cn.undp.org/content/dam/china/docs/Publications/UNDP-CH-HD-Publication-NHDR\\_2013\\_EN\\_final.pdf](http://www.cn.undp.org/content/dam/china/docs/Publications/UNDP-CH-HD-Publication-NHDR_2013_EN_final.pdf).

<sup>4</sup> For each country the level of detail on prevalence varies. As a result some countries may not have prevalence for cataract, glaucoma and other. Regardless of any missing prevalence rates, all forms of blindness outlined are included in the analysis (excluding Macular Degeneration which is not considered as 'avoidable'). Note that all assumptions used specific to Yunnan are outlined in Table 2.

## Introduction

A series of four reports from PwC which were commissioned by The Fred Hollows Foundation and other key Non Government Organisations (NGOs) across the eye care sector analysed the costs and benefits of VISION 2020: The Right to Sight - the global initiative for the elimination of avoidable blindness and visual impairment, a joint program of the World Health Organisation and the International Agency for the Prevention of Blindness. The analysis culminates in the final report, *Investing in Vision* which presents the estimated cost benefit analysis associated with the elimination of avoidable blindness and visual impairment. At a global level, the benefits are shown to outweigh the costs by a factor of 2.1. Disaggregated by developing and developed countries, the global analysis shows that for developing countries, total benefits outweigh the costs by a factor of 4.0.<sup>5</sup>

Having established the value of investing in vision and eliminating avoidable blindness and visual impairment on a global and regional level, the next question is – what does this look like on a country or regional level? This information is especially valuable for those operating on the ground to advocate to national/state governments that investing in vision is worthwhile. The approach to generate country/regional level estimates has been to request data from local experts and ministries of health. Our estimates have been reviewed by a reference group including subject matter experts and NGOs that operate in the country.

This analysis is based on prevalence, eye health workforce data and unit cost of treatment data for the Yunnan Province in China. Where data was not available for the Yunnan Province specifically, national data and assumptions have been used. This analysis takes place two years after the initial estimates of the cost to eliminate avoidable blindness and visual impairment were completed. Results are therefore reported for the period 2013-2020 and take into account the new prevalence data for the Yunnan Province and the declining trend in avoidable blindness and visual impairment prevalence globally.

## *In the Yunnan Province, China, the benefits of eliminating avoidable blindness and visual impairment far exceed the investment required*

Yunnan is the most south-western province in China and one of the country's least-developed. A recent United Nations study found that Yunnan Province had the third-lowest Human Development Index (HDI) score of all Chinese provinces<sup>6</sup>. Studies have also shown that pockets of very high rates of poverty exist in the province<sup>7</sup>.

A Rapid Assessment of Avoidable Blindness (RAAB) survey conducted in Yunnan province identified that 85.9% of blindness in Lancang County and 70% in Jianchuan County is avoidable with the prevalence of blindness in females being twice that of males.<sup>8</sup>

The benefits to eliminating avoidable blindness and visual impairment are significant in the Yunnan Province, China, overriding costs by a factor of over **3.2** times. That is, for each dollar invested in the efforts to eliminate avoidable blindness, a return of over **\$3.16** is experienced. A summary of the benefits and costs is provided in Table 1 below.

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<sup>5</sup> Further information on the approach to the analysis is available online in the report series at <<http://www.hollows.org.au/our-work/the-price-of-sight>>.

<sup>6</sup> China National Human Development Report 2013, p105 - China National Human Development Report 2013. [http://www.cn.undp.org/content/dam/china/docs/Publications/UNDP-CH-HD-Publication-NHDR\\_2013\\_EN\\_final.pdf](http://www.cn.undp.org/content/dam/china/docs/Publications/UNDP-CH-HD-Publication-NHDR_2013_EN_final.pdf).

<sup>7</sup> Ahmad, Y. and C. Goh (2007), Poverty maps of Yunnan province: Uses and lessons for scaling-up in China', in T. Bedi, A.Coudouel, and K. Simler (eds.), More than a pretty picture: Using poverty maps to design better policies and interventions. Washington, D.C.: World Bank.

<sup>8</sup> Wu, Yup, Kuper, *Rapid Assessment of avoidable blindness in Kunming, China (Ophthalmology, June 2008)*.

**Table 19: Benefits and costs to eliminate avoidable blindness and visual impairment in the Yunnan Province, China 2013-2020 (USD 2013)**

Benefits (\$)		Costs (\$)	
Economic benefits	\$4.5 billion	Primary and secondary health system	\$1.4 billion
Direct health benefit	\$0.3 billion	Backlog of current prevalence and incidence to 2020	\$0.2 billion
<b>TOTAL quantified benefits</b>	<b>\$4.7 billion</b>	<b>TOTAL cost</b>	<b>\$1.5 billion</b>

**Benefit Cost Ratio of 3.16**

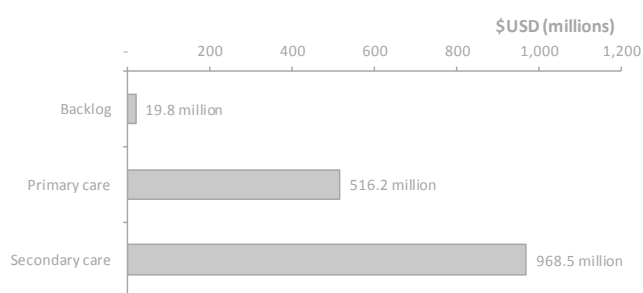
### Costs to eliminate avoidable blindness and visual impairment

In the Yunnan Province, China, the cost to eliminate avoidable blindness and visual impairment between 2013 and 2020 totals **\$1.5 billion**<sup>10</sup>. This amount represents the additional investment required beyond recurrent expenditure in eye health care to develop sustainable primary and secondary eye health care systems, as well as the investment required to treat the backlog of people currently experiencing blindness and visual impairment.

- The cost of treating and eliminating the backlog which includes prevalence and incidence by 2020 is **\$19.8 million** over eight years. This equates to **\$0.39 per capita**.<sup>11</sup>
- The investment required to build an ideal eye health primary system<sup>12</sup> to sustain the elimination of avoidable blindness and visual impairment is **\$516.2 million** over eight years. This equates to **\$10.19 per capita**.
- The investment required to build an ideal eye health secondary system<sup>13</sup> to sustain the elimination of avoidable blindness and visual impairment is **\$968.5 million** over eight years. This equates to **\$19.12 per capita**.

These costs are depicted in Figure 1 below.

**Figure 1: Total costs of eliminating avoidable blindness and visual impairment in the Yunnan Province, China over eight years (USD 2013)**



<sup>9</sup> Values reported may not sum accurately due to rounding.

<sup>10</sup> All dollar figures are reported in USD 2013.

<sup>11</sup> Per capita has been calculated by dividing the relevant cost or benefit by the population in 2010.

<sup>12</sup> Primary health care is care that is provided in the community – for example general practice. It incorporates treatment given by the first contact provider along with promotional, preventive and rehabilitative services provided by multi-disciplinary teams of health care professionals working collaboratively (Definition drawn from WHO).

<sup>13</sup> Secondary care is an intermediate level of health care that includes diagnosis and treatment, often performed in a hospital. Patients who cannot be fully treated at the primary level are referred to secondary services, for example consultations with specialists.

The secondary health care costs comprise the majority of total expenditure in each year. This cost is driven by higher expenses to provide this care, including training and workforce costs.

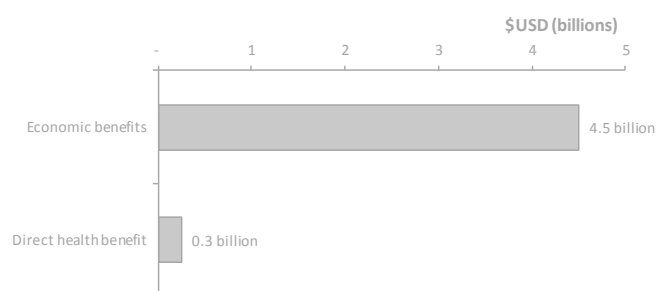
### ***Benefits to eliminate avoidable blindness and visual impairment<sup>14</sup>***

In total, the quantifiable benefits that arise from the elimination of avoidable blindness and visual impairment in the Yunnan Province, China accrue to **\$4.7 billion** over eight years. Benefits quantified include:

- A productivity benefit of **\$4.0 billion** experienced when treated blind and visually impaired persons return to work, an economic benefit. This equates to **\$79.90 per capita**.
- A productivity benefit of **\$451.9 million** experienced by carers of treated blind and visually impaired persons who have increased opportunity to participate in the workforce, education or increased leisure time, an economic benefit. This equates to **\$8.90 per capita**.
- The averted deadweight loss of **\$4.4 million** associated with the elimination of avoidable blindness and visual impairment, an economic benefit.

**The averted costs of \$257.8 million associated with falls of those with blindness and visual impairment, a health benefit. This equates to \$5.09 per capita.** A summary of these benefits is provided in Figure 2 below.

**Figure 2: Total benefits from eliminating avoidable blindness and visual impairment in the Yunnan Province, China over eight years (USD 2013)**



### ***Productivity benefit to blind and visually impaired persons***

For those of working age that are blind or visually impaired, addressing their blindness or visual impairment will generate a productivity benefit of **\$4.0 billion** over eight years.

This benefit has been calculated based on the national assumptions that in China, 42.3% of blind and visually impaired people are of working age and of these, the employment rate in the Chinese blind and visually impaired population is 32%. This assumes that in the absence of blindness and visual impairment, those treated would be employed at the same rate as the national average (Taylor et al 2006, Roberts et al 2010).

<sup>14</sup> Values reported may not sum accurately due to rounding.

### *Productivity benefits to carers*

In China, it is assumed that there are 0.67 carers for every blind person, with carers assumed to experience lower productivity. If avoidable blindness or visual impairment is eliminated, it is expected that carers will be able to increase their productivity through employment, education or alternatively through additional leisure time. Therefore, it is assumed that all carers are at a productive loss, regardless of their age to a value of 10% of a person's total average yearly productivity<sup>15</sup>. This equates to a productivity benefit in the Yunnan Province of China of **\$451.9 million** over 8 years.

### *Deadweight loss cost averted*

The deadweight loss cost in a country refers to the additional expenditure focused around those with avoidable blindness or visual impairment. The approach to estimate the value of averted deadweight loss uses direct health expenditure per person, assumed to equal falls related costs, the proportion of health costs funded by the government and the Marginal Cost of Public Funds (MCPF) for which the assumption of a ratio of 1.20 is used. This means that for every extra dollar of tax revenue raised, a cost of \$0.20 incurred due to avoidable blindness and visual impairment.

Over the period from 2013 to 2020, the estimated averted deadweight loss from eliminating avoidable blindness and visual impairment in the Yunnan Province of China is **\$4.4 million** over eight years.

### *The direct health system costs averted for falls*

The main co morbidity associated with avoidable blindness and visual impairment is the increased likelihood of a fall which places additional costs on the health system. Other co morbidities may include depression, however there is limited evidence with which to quantify its impact. The direct health benefit from eliminating avoidable blindness and visual impairment is calculated as the cost averted of additional health system expenditures related to falls. The assumption used to calculate the averted falls benefit has been made at a national level and is based on an average cost of falls across a number of developed countries in the literature (Cruess et al 2008). This cost was assumed to be an overestimate for China and therefore it has been adjusted down for the analysis using a weighted GDP/capita approach. The benefit due to averted falls in the Yunnan Province is estimated to be **\$257.8 million** from 2013-2020.

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<sup>15</sup> The 10 per cent assumption for productivity loss is in line with the approach taken for the global estimates completed for this analysis.

## Country profile and select assumptions

Key assumptions used in the calculation of the costs and benefits of eliminating avoidable blindness and visual impairment in the Yunnan Province of are displayed in Table 2 below. The purpose of this analysis is to draw on the latest country specific data where possible to determine the costs and benefits of eliminating avoidable blindness and visual impairment.

**Table 2: China profile**

Data element	Value	Source
Yunnan Province of China population, 2010	45,616,094	World Bank population data.
Number of avoidably blind and visually impaired in the Yunnan Province	1,264,714	Calculated based on: <ul style="list-style-type: none"> <li>Cataract prevalence data obtained in the Yunnan Province, 2008</li> <li>Prevalence data by condition obtained from Wu, Yup, Kuper, <i>Rapid Assessment of avoidable blindness in Kunming, China (Ophthalmology, June 2008)</i>.</li> </ul>
Portion of blind/visually impaired prevalence that is working age (15-65)	42%	National assumption calculated based on Pascolini and Mariotti's 2011 Global Estimates of Visual Impairment – in which 28% of total prevalence fell within the 15-49 age group.
Chinese unemployment rate, 2011	4%	Trading economics: <a href="http://www.tradingeconomics.com/china/indicators">http://www.tradingeconomics.com/china/indicators</a>

### Selected key assumptions used in the analysis

- All results are reported in 2013 United States Dollars (USD 2013).
- The average annual salary (China) is \$3,193 USD per person. This salary is used for all estimates involving productivity and the workforce where working age is considered to be 15-65 years. Salary data for ophthalmologists and other eye health personnel was provided separately.
- This analysis does not include macular degeneration as this was not deemed to be 'avoidable blindness and visual impairment'.
- The assumptions used in this analysis are based off country level data provided by country managers.
- For a bibliography of the sources used in the analysis, please see the full report at <<http://www.hollows.org.au/our-work/the-price-of-sight>>.