

# Causes of Severe Visual Impairment and Blindness: Comparative Data From Bhutanese and Laotian Schools for the Blind

Lachlan David Mailey Farmer, MBBS,\*†‡ Soo Khai Ng, MBBS,\*† Adam Rudkin, MBBS,\*†  
 Jamie Craig, FRANZCO,‡¶ Dechen Wangmo, MD,§ Hughie Tsang, FRANZCO,¶  
 Khamphoua Southisombath, MD,|| Andrew Griffiths, BSc(Hons),¶ and James Muecke, FRANZCO\*†¶

**Purpose:** To determine and compare the major causes of childhood blindness and severe visual impairment in Bhutan and Laos.

**Design:** Independent cross-sectional surveys.

**Methods:** This survey consists of 2 cross-sectional observational studies. The Bhutanese component was undertaken at the National Institute for Vision Impairment, the only dedicated school for the blind in Bhutan. The Laotian study was conducted at the National Ophthalmology Centre and Vientiane School for the Blind. Children younger than age 16 were invited to participate. A detailed history and examination were performed consistent with the World Health Organization Prevention of Blindness Eye Examination Record.

**Results:** Of the 53 children examined in both studies, 30 were from Bhutan and 23 were from Laos. Forty percent of Bhutanese and 87.1% of Laotian children assessed were blind, with 26.7% and 4.3%, respectively, being severely visually impaired. Congenital causes of blindness were the most common, representing 45% and 43.5% of the Bhutanese and Laotian children, respectively. Anatomically, the primary site of blinding pathology differed between the cohorts. In Bhutan, the lens comprised 25%, with whole globe at 20% and retina at 15%, but in Laos, whole globe and cornea equally contributed at 30.4%, followed by retina at 17.4%. There was an observable difference in the rates of blindness/severe visual impairment due to measles, with no cases observed in the Bhutanese children but 20.7% of the total pathologies in the Laotian children attributable to congenital measles infection.

**Conclusions:** Consistent with other studies, there is a high rate of blinding disease, which may be prevented, treated, or ameliorated.

**Key Words:** childhood, children, blindness, visual impairment, Laos, Bhutan, blind school

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The purposes of this study were to determine the major causes of blindness (BL) and severe visual impairment (SVI) in children and adolescents attending schools for the blind and to identify preventable and treatable causes within 2 Asian nations, Bhutan and Laos. Identical cross-sectional observational studies were undertaken in each nation. This study adds to several others

undertaken by our organization, Sight For All Foundation, which aims to provide epidemiological data relating to the burden of eye disease from poor and very poor countries in Asia.<sup>1,2</sup>

The estimated global prevalence of childhood blindness is approximately 1.4 million, 1 million of whom live in Asia and 300,000 in Africa.<sup>3</sup> Although childhood blindness makes up a small proportion (approximately 4%) of the world's blind population, it is considered an important area to address for a number of reasons: many causes of blindness in these children are avoidable either through prevention or early treatment; the conditions causing childhood blindness are often multisystemic and carry with them significant morbidities<sup>4–6</sup>; and the public health burden of childhood blindness is considerably greater than blindness acquired later in life.<sup>6</sup>

Reliable population-based data on the causes of blindness in children are difficult to obtain as such surveys require very large samples, making them labor intensive and costly. Studies designed around examining children in schools for the blind are advantageous in that they allow a relatively large number of children to be examined during a short period by only a few observers using standardized methods.<sup>7</sup> In this study, the participants were from various institutions designed specifically to assist both blind and significantly visually impaired children in Bhutan and Laos.

Bhutan is a Himalayan country with an estimated population of 761,800 as of 2014, with 53% being male. Bhutan has a comparatively older population profile for the region, with 29% aged 0 to 14 years and nearly 6% older than age 65.<sup>8</sup> Bhutan's economy is one of the world's smallest and least developed, with an estimated 23.2% of the population falling under the international poverty line in 2008.<sup>9</sup> Currently, Bhutan has 7 practicing ophthalmologists—an estimated 1 ophthalmologist per 108,000 people. The majority of ophthalmologists work within the National Referral Hospital in the country's capital, Thimphu.

The Lao People's Democratic Republic (Laos) is a low-income country in Southeast Asia with approximately one third of its people living below the international poverty line.<sup>10</sup> It had an estimated population of 6,587,280 in 2014, with a near even male-to-female distribution.<sup>11</sup> Laos has a young population, with 39% aged 0 to 14 years and only 4% older than age 65.<sup>11</sup>

In Laos, 1 large prospective, cross-sectional survey investigated the prevalence of refractive error and visual impairment in children attending regular primary schools.<sup>12</sup> No study has yet been published looking exclusively at children attending schools for the blind. To our knowledge, there has been no previous study of this kind performed in Bhutan.

## MATERIALS AND METHODS

The methods used for this study are identical to similar blindness studies undertaken by the Sight For All Foundation in Southeast Asia.<sup>1,2</sup>

The Bhutanese component was conducted at the National Institute for Vision Impairment, the only dedicated school for

From the \*South Australian Institute of Ophthalmology; †Discipline of Ophthalmology and Visual Sciences, University of Adelaide; ‡Department of Ophthalmology, Flinders University, Flinders Medical Centre, Adelaide, South Australia; §Department of Ophthalmology, JDWNR Hospital, Ministry of Health, Thimphu, Bhutan; ¶Sight For All—A Shared Vision, Adelaide, South Australia; and ||National Ophthalmology Centre, Vientiane, Lao People's Democratic Republic.

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Reprints: Lachlan David Mailey Farmer, MBBS, South Australian Institute of Ophthalmology, Level 8, East Wing, Royal Adelaide Hospital, North Terrace, Adelaide, South Australia 5000. E-mail: lachlan.farmer@gmail.com.

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