

**Refractive Error in Children in Cambodia and
Childhood Blindness/Severe Visual Impairment in
Sri Lanka**

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Abstract

This study has two main components with a common theme of paediatric ophthalmology in Asia. The first component aimed to assess the prevalence of refractive error in 12-14 year old children in urban Phnom Penh and rural Kandal Provinces of Cambodia. The prevalence of refractive error in Cambodia has not been previously studied and is important for the planning and implementation of refraction services. Uncorrected refractive error is a leading cause of visual impairment worldwide and can have a dramatic impact on a child's learning capability. The chief aim of the second component was to determine the major causes of childhood blindness and severe visual impairment in Sri Lanka, in particular those that are avoidable and what public health strategies need to be implemented to address them.

A randomised cluster sample cross-sectional survey of ten schools from Phnom Penh Province and 26 schools from Kandal province was undertaken in October 2010. Random selection of children at each school was used to identify the study sample. Children were examined by teams of Australian and Cambodian optometrists, ophthalmic nurses and ophthalmologists who performed visual acuity (VA) testing and cycloplegic refraction. 5527 children were included in the study. The prevalences of uncorrected, presenting and best-corrected VA $\leq 6/12$ in the better eye were 2.48%, 1.90%, and 0.36% respectively. In Phnom Penh Province, the prevalences of uncorrected, presenting and best-corrected VA $\leq 6/12$ in the better eye were 5.91%, 4.36% and 0.75% respectively. In Kandal Province, the prevalences of uncorrected, presenting and best-corrected VA $\leq 6/12$ in the better eye were 0.51%, 0.51% and 0.14% respectively. Only 43 children presented with glasses whilst a total of 315 glasses were dispensed. The total prevalence of refractive error was 6.57% but

there was a significant difference between urban (13.7%) and rural (2.5%) schools (p value < 0.0001). Refractive error accounted for 82.3% of the visual impaired eyes, cataract for 1.7%, and other causes in 7.1%. Myopia (spherical equivalent of $\leq -0.50\text{D}$ in either eye) affected 5.5% of 12 year old children increasing to 6.0% of 14 year olds. Myopia was associated with increased age, female gender and schooling in urban centres.

Thirteen schools for the blind were visited in Sri Lanka between October 2008 and October 2009 by a team of ophthalmologists and optometrists. Each child's examination findings were recorded in a standardized World Health Organisation Prevention of Blindness Eye Examination Record for Childhood Blindness Form. Of the 206 children surveyed, 83.5% were blind (BL=Visual acuity [VA] <3/60), and 9.2% had severe visual impairment (SVI=VA <6/60 to 3/60 in the better eye) on presentation. The major anatomical site of BL/SVI was the retina in 35.9% of cases, followed by the whole globe in 22.4% of cases. The major underlying aetiologies of BL/SVI were unknown in 43.75% of cases and hereditary in 37.5%. Avoidable causes of BL/SVI accounted for 34.9% of cases; retinopathy of prematurity made up the largest proportion of this subgroup. The data support the need to develop specialised paediatric ophthalmic services, particularly in the face of advancing neonatal life support in Sri Lanka. One third of the children could have had improved vision with the prescription of an optical device highlighting the need for increased optician services.

DECLARATION

I am aware of no conflicts of interest, of any nature, pertaining to this manuscript. The South Australian Institute of Ophthalmology, The Fred Hollows Foundation and Sight For All Foundation funded the study, but the design of the survey and its execution, analysis, interpretation, and publication were carried out independently by myself (Zoe Gao) and those acknowledged within this manuscript.

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution to Zoe Gao and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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TABLE OF CONTENTS

TABLES AND FIGURES

List of Tables viii

List of Figures x

ABBREVIATIONS xi

CHAPTER ONE 1

Refractive error in Children

Normal development of the Eye 1

Refractive Error 2

The Aetiology of Myopia 4

The Sclera 6

Current Epidemiological Data 10

References 13

CHAPTER TWO 19

Childhood blindness and visual impairment

Global blindness 19

Childhood blindness in SE Asia 20

Childhood blindness in Australia 22

References 23

CHAPTER THREE 24

Refractive Error in School children in an

Urban and Rural Setting in Cambodia

Introduction 31

Methods 32

Results 37

<i>Discussion</i>	43
<i>Conclusion</i>	47
<i>References</i>	49
CHAPTER FOUR	52
A survey of severe visual impairment and blindness in children attending thirteen schools for the blind in Sri Lanka	
<i>Introduction</i>	60
<i>Methods</i>	62
<i>Results</i>	65
<i>Discussion</i>	73
<i>Conclusion</i>	77
<i>References</i>	78
CONCLUSION	81

LIST OF TABLES

Table 1.1 – Demographic details of Cambodian study population. (Page 38)

Table 1.2 – Presenting, uncorrected and best corrected VA better eye. (Page 39)

Table 1.3 – Prevalence of Ametropia by Sex, Urban location and Age. (Page 41)

Table 1.4 – Breakdown of refractive error by urban versus rural location, gender and age.
(Page 41)

Table 1.5 – Multivariate logistic regression. (Page 42)

Table 1.6 – Causes of Visual impairment. (Page 43)

Table 2.1 – Visual acuity in all 206 children. (Page 65)

Table 2.2 – Demographic details. (Page 66)

Table 2.3 – Anatomical site of abnormality. (Page 68)

Table 2.4 – Aetiological categories of visual loss. (Page 70)

Table 2.5 – Avoidable causes of visual loss. (Page 71)

Table 2.6 – Presenting vision in better eye for children prescribed optical devices. (Page 72)

Table 2.7 – Causes of visual loss for children prescribed optical devices. (Page 72)

LIST OF FIGURES

Figure 1: Diagram representing emmetropia, myopia and hypermetropia. (Page 2)

Figure 2: Flowchart of proposed model of scleral remodelling in the development of myopia. (Page 9)

ABBREVIATIONS

BL: Blind

BVA: Best corrected visual acuity

CI: Confidence Interval

D: Dioptres

LVA: Low Vision Aid

NPL: No Light Perception

ROP: Retinopathy of Prematurity

PBL ERCB: Prevention of Blindness Eye Examination Record for Childhood Blindness

PVA: Presenting visual acuity

SVI: Severe visual impairment

TGF- β : Transforming growth factor- β

UNESCO: United Nations Education, Scientific and Cultural Organisation

UVA: Uncorrected visual acuity

VA: Visual acuity

WHO: World Health Organisation