Standard school eye health guidelines for low and middle-income countries

IAPB School Eye Health Work Group

International Agency for the Prevention of Blindness
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Standard Guidelines for Comprehensive School Eye Health Programmes Background:

This evidence-based document is based on best practice guidelines initially developed through a joint collaboration between Sightsavers International, the London School of Hygiene and Tropical Medicine and the Brien Holden Vision Institute. Various organisations have also contributed to this document's revisions, including the Fred Hollows Foundation, World Council of Optometry, Peek Vision, CBM, Seeing is Believing, Light for the World and Avicenna Consulting.

The authors are grateful to members of the IAPB School Eye Health Working Group, and colleagues from their respective organisations, for their review and feedback on the earlier version of these guidelines. We acknowledge the contribution of the government officials from various line departments including departments of health and education, members of various non-government organisations, teachers, health workers, children and their parents who jointly contributed their wisdom and experiences that led to the development of these guidelines.

We would like to place on record the great contributions Dr. Hannah Faal has made in bringing school eye health into the mainstream and for pioneering the work and being a source of motivation and guidance for us.

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Disclaimer: These guidelines represent minimum clinical guidelines for school eye health, with a focus on low and middle-income countries. Where they exist, in-country formal and legal guidelines or protocols for school

health or eye health should be considered and integrated. These guidelines are not prescriptive and are not intended to replace local legislation.

Cover photograph: School children during an eye screening event submitted by Seema Banerjee (for WSD 16)
We welcome feedback on your experience of using these guidelines. Please contact the authorship group via Hasan Minto at: h.minto@brienholdenvision.org

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Foreword

Comprehensive School Eye Health Programs: A Unique Opportunity

School health programs are a unique opportunity to provide comprehensive eye health services to potentially more than 700 million children throughout the world. Looking into the future, this number will only increase, especially in low income countries, due to the combined effect of population growth and increasing provision of primary and secondary education schooling.

Access to eye care for an increasing number of school age children is critically important for at least four reasons:

First, it is a golden opportunity to deliver eye health education messages ranging from hygiene to healthy diet and outdoor activities to prevent trachoma, vitamin A deficiency, diabetes and high myopia. In that respect eye health promotion – and corresponding policies – have a long-term, sustainable impact on both individuals and communities. Health education to reduce stigma associated with visual impairment or spectacle wear is another essential yet neglected aspect.

Second, early detection and referral of children with eye problems is key to timely provision of highly cost-effective interventions such as provision of glasses. School-based screening programs allow early detection of conditions that cannot be cured but require appropriate low vision services. These include inclusive education, to ensure that each and every child can achieve his or her full potential. This further contributes to the social and economic development at individual and community level.

Third, irritated, sore, light sensitive eyes significantly impede children's ability to learn and may lead to the use of harmful practices, which can further damage the eyes. In some areas, eye morbidity represents a significant cause of school dropout. The detection and treatment of common eye conditions, such as conjunctivitis and lid infections are a critical part of child-centred comprehensive school health programs.

Fourth, considering that 80%(estimate) of what a child learns is processed through the visual system, good vision is critical to the child's ability to participate in and benefit from educational experiences. In that respect, improving the vision of school children contributes to improved education status, which in turn leads to better health in adult age, a spiralling up, virtuous, circle.

Because of the outstanding experience of the authors – as a team they cover the whole spectrum of eye health – these guidelines provide not only a very comprehensive approach to school eye health but also some practical keys to integrate it into general health policies and programs.

For example, a section highlights some of the challenges in current school eye health initiatives and provides a framework in which school eye health is integrated into school health programs. Case studies are provided to emphasise the integrated approach and a 15-step approach, from situation analysis to monitoring and evaluation, is suggested. Practical recommendations for implementation are provided, including information on the equipment and technology required.

These guidelines are for you, if:

- You are involved in school health or eye health

- You are a policy maker, a manager, a service provider
- You are a stakeholder or a member of the education community
- You are simply interested in making peoples' lives better

They will help you set up, develop or strengthen comprehensive eye health programs, as an integral part of school heath. And where school health programs do not yet exist, eye health can be a very effective stepping stone to initiate the development of other essential components of school heath.

Clearly a win-win situation in both cases.

Prof Serge Resnikoff - MD PhD

Purpose of the guidelines

Child eye health is a significant public health issue, particularly in low and middle-income countries, and requires well-integrated, innovative strategies to address the growing need. The consequences of inaction range far beyond vision, affecting education, social participation and future economic productivity. The UN Convention on the Rights of the Child is the most ratified human rights convention in history, providing a mandate for communities, civil society and governments to come together to address child eye health. Promoting and improving the eye health of all, including children will also contribute to several of the Sustainable Development Goals (Gray 2016).

Primary school education is at the base of the pyramid of education and is regarded as a fundamental human right. As an essential component of human capital, primary education plays an important role in the economic growth and development of a country. This population holds the potential to create a better society, with democracy, equity and greater wellbeing. The challenge is to provide conditions which meet the basic needs of children, particularly in health and education. This places a significant responsibility on the education and health sectors. Education has the potential not only to change individuals' lives but to fuel fundamental social transformation. There are global initiatives to improve health through schools, such as health promoting schools initiatives, deworming and control of other neglected tropical diseases, and programs for human papilloma virus (HPV) immunization of adolescent are being scaled up. These initiatives provide an opportunity for integrating eye health, hence increasing sustainability and coverage. It is anticipated that the implementation of child eye health within the school health approach will enable a more comprehensive and integrated approach for sustainability and scalable child eye health programs and greater efficiency and cost effectiveness.

Many school eye health initiatives focus on the detection and treatment of under- or un- corrected refractive errors (uRE) in school going children, with referral of those with other eye conditions. This narrow focus is not an efficient use of resources and does not address the eye health needs of teachers, children with other disabilities and those who are out of school. Locally endemic eye conditions of children are also usually not addressed, such as trachoma and vitamin A deficiency disorders. These guidelines provide details of how to plan and implement programs for refractive error (RE) and provide guidelines on how other groups and eye conditions could be included.

The purpose of these best practice guidelines is to provide direction to those planning and implementing eye health initiatives for schools, including policy makers, health care and educational authorities, health planners, eye care delivery organizations and professionals, in partnership with teachers, parents and children. In situations where resources for eye health are limited, decisions need to be made to ensure that programs not only address public health problems but are also implemented in a way that is effective, efficient and, wherever possible, sustainable. Systems for monitoring and plans for evaluation should also be developed at the outset.

These practice guidelines provide an excellent learning resource for a module on school eye health that can be incorporated in optometry and ophthalmology residency curricula.

An earlier version of these guidelines was developed jointly by the Brien Holden Vision Institute, the International Centre for Eye Health and Sightsavers, drawing on the increasing body of evidence of the eye health needs of children and adults of working age, as well as examples of best practice. In 2017 the initial guidelines were reviewed and updated by the IAPB School Eye Health working group, comprising school eye health programming experts from across the IAPB membership.

Finally, child eye health programs need to have appropriate child protection mechanisms to ensure the safety of children who come in contact with the programs.

List of abbreviations

D	Dioptres
DR	Diabetic retinopathy
GPE	Global Partnerships for Education
NGO	Non-government organization
RE	Refractive error
RESC	Refractive Error Study in Children
SDG	Sustainable Development Goal
SOP	Standard Operating Procedure
ST-DR	Sight-threatening diabetic retinopathy
uRE	Uncorrected refractive error
VA	Visual acuity
VADD	Vitamin A deficiency disorders
WHO	World Health Organization
UN	United Nations

Chapter 1 - Introduction

Approaches and scope of school health

An efficient school health program can be one of the most cost-effective investments a nation can make to improve education and health. This has led to several global initiatives to enhance school health in the context of health, education, national development, rights of children and persons with disabilities. The Education for All campaign, which was launched in 1990 by UNESCO, other UN agencies and the World Bank, is a global commitment to universalize primary education and improve literacy on a global scale.

The preferred approach for the delivery of an effective school eye health program is an alignment between education and health systems to ensure that quality eye health services are available and accessible to all children. Eye health is an essential part of a school health program and should be comprehensive and respond to the relevant range of eye conditions and diseases prevalent in the program area. Strategies for school eye health programs need to be comprehensive and go beyond the detection and treatment of refractive errors. This is in line with global school health initiatives such as the WHO's "Health Promoting Schools"; UNICEF's Child Friendly School initiative and UNESCO's Focusing Resources on Effective School Health.

Health promoting school initiatives are broad, comprehensive, multidisciplinary and responsive approaches for understanding and addressing children in the context of their daily life, within their family, community and society. Initiatives usually have one or more of the following elements: formal health curriculum, ethos and environment of the school and engagement with families or communities or both (Langford et al. 2014). These initiatives have been implemented in many low and middle-income countries over the last 20 years. They promote healthy and enabling environments for children and strengthen health and life skills education which are critical ingredients for quality education, improving health and nutrition, healthy lifestyles and life skills among school children. They may also contribute to quality secondary education, increase school performance and reduce dropout rates.

In all communities uRE is the most common cause of poor vision which can have an impact on a child's life through difficulties with activities of daily living, mobility, reading and fine work. This can have an impact on education, personal development and economic productivity. For example, it is estimated that at least one third of the world's 72 million children who are not in school have a disability (including those with a vision impairment) (UNESCO 2009). One of the main drivers of school eye health programs is the detection and treatment of uREs.

Many of the other causes of poor vision in children, such as vitamin A deficiency disorders, preterm birth, measles and congenital rubella syndrome, are also causes of child morbidity and mortality. In developing countries, a large proportion of children die within a few years of becoming blind, from systemic complications of the condition causing blindness, or because of poor support of families with blind children (Gilbert & Rahi 2011). Many of these conditions are avoidable through cost effective interventions and much can be done through primary health care and school health programs which promote healthy behaviours and including early detection and referral of children with eye problems in school eye health initiatives.

Detection and management of common eye problems such as conjunctivitis should also be included as sore, light sensitive eyes can affect a child's ability to learn or may lead to carers seeking harmful traditional treatments.

The mandate

The Convention for the Rights of the Child was adopted by the United Nations (UN) in 1989, which recognised for the first time that children have rights of their own and are not passive objects of care and charity. It became the most ratified Convention in history. Poor eye health affects the realisation of these rights. For example, a child's right to health including treatment of illness and rehabilitation of health, their right to education and the right to an adequate standard of living.

As a result, many global action plans call for improvement in the living conditions of children. The UN Convention on the Rights of Persons with Disabilities makes specific reference to the rights of children with disabilities and the responsibility of States to ensure the full enjoyment by children with disabilities of all human rights. In addition to this, UN Millennium Development Goals two and four included achieving universal primary education and reducing child mortality. The World Health Organization (WHO) has made childhood blindness a priority and calls for action in prevention, treatment and rehabilitation.

The prevention, detection and treatment of eye conditions in children is also enshrined in several of the UN's Sustainable Development Goals (Figure 1):

Figure 1. The United Nations Sustainable Development Goals
(source: Transforming Our World - the 2030 Agenda for Sustainable Development https://sustainabledevelopment.un.org/)

The Global Goals for Sustainable Development can be linked with children's vision as depicted in figure 2 (Our Children's Vision 2016).

Goal #1: No Poverty: "Restoring someone's sight is the single most cost-effective health intervention to reduce poverty" (World Health Organisation 2010). Approximately 90% of the world's vision impaired live in developing countries (World Health Organisation 2014).

Goal #3: Good Health and Well Being: By 2050 half of the world's population will be short sighted (myopic) (Holden et al. 2016) - potentially the biggest public health issue of our generation. Up to 80% of vision impairment is preventable or treatable (World Health Organisation 2012).

Goal #4: Quality Education: If you struggle to see, you struggle to learn: 80% of what young children learn is processed through their sight. Approximately 90% of children with disabilities who live in developing countries are deprived of schooling, and this includes children with visual loss (UNICEF 2015).

Goal #5: Gender Equality: Women and girls are less likely to access vision services in many countries. If a girl has her vision corrected, she has a better chance of achieving more at school. And for each year she stays in school her income will rise by 10-20% (Plan International 2015). An educated girl will grow up to gain her rightful place in society and be a force for change, raising the status of girls and women.

Goal #8: Good Jobs and Economic Growth: The global economy loses USD$202 billion in productivity each year because of uncorrected vision impairment (Smith et al. 2009). That's more than the total GDP of sixty countries – combined.

Goal #10: Reduce Inequalities: The burden of blindness lies with developing countries. The prevalence of blindness in children is approximately 10 times greater in developing countries than in developed countries (Gilbert & Rahi 2011).

Figure 2.The link between the Sustainable Development Goals (SDGs) and children's vision
(Source: http://www.ourchildrensvision.org/)

As such, the mandate for ensuring eye health access for all children, regardless of gender, disability, race, religion or geographic location, is clear.

Child protection and code of conduct

All children and young people have equal rights to protection from physical, emotional and sexual abuse, neglect and exploitation regardless of their gender, race, religion, abilities, social or cultural background, or any other distinguishing characteristic.

Child protection is defined as the **prevention** and **response to** all forms of violence, abuse, neglect and exploitation of children, including sexual abuse, as well as physical and emotional abuse. Organisations have a responsibility to ensure their staff, operations and programs "do no harm" to children (whether harm is intentional or not) and that any concerns the organisation has about children's safety within the communities in which they work are reported to the appropriate authorities.

In many cases, school-based eye health activities are carried out within existing structures and by staff already in place, and not employed by the project. In such cases, discussions on child protection are best held at the start of the project with a view to covering the entire duration of the project, rather than per activity, and should focus on the school's capacity to ensure children are safe during eye health activities.

All organisations or agencies planning to implement a school eye health program should have a policy or guidelines on child protection which are shared with all members of the school eye health team.

Chapter 7 provides more detail about how child protection considerations can be incorporated into your program.

Chapter 2 – The need for school eye health

A number of conditions cause vision impairment in children. Among them are uncorrected refractive errors (uRE), trachoma, vitamin A deficiency disorders (VADD), cataracts, retinopathy of prematurity, etc. This section provides evidence of the importance of uRE as a cause of vision impairment in children and gives data on regional variations in the prevalence, magnitude and type of RE. It is followed by a brief review of where trachoma and VADD are public health problems and gives information on eye conditions which may affect teachers.

Refractive errors as a cause of vision impairment in children

The Refractive Error Study in Children (RESC) used a definition of vision impairment of ≤20/40 (≤6/12) in the better eye. In all eight surveys (Figure 3) uREs were the most common causes of vision impairment in children aged 5 or 7 to 15 years, ranging from 62% to over 90% (Naidoo & Jaggernath 2012).

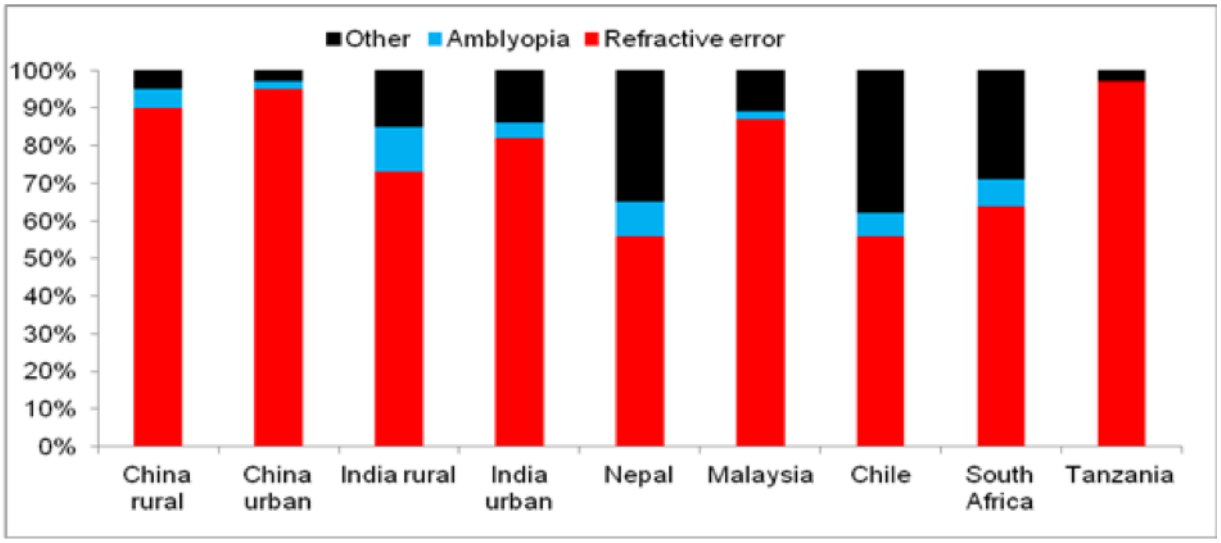


Figure 3. Refractive errors as a cause of vision impairment in children

Prevalence of refractive errors

In all regions myopia is the most common type of RE in children.

Myopia

A recent systematic review and meta-analysis of the prevalence, incidence, distribution and magnitude of myopia in children included 143 articles in 164 separate study populations, from 42 countries, shows considerable variation in the prevalence by ethnicity and age, with the prevalence increasing in all ethnicities with age (Rudnicka et al, 2016). The definition of myopia used was ≥-0.50D. Children in East Asia had the highest prevalence at each age (Figure 4).

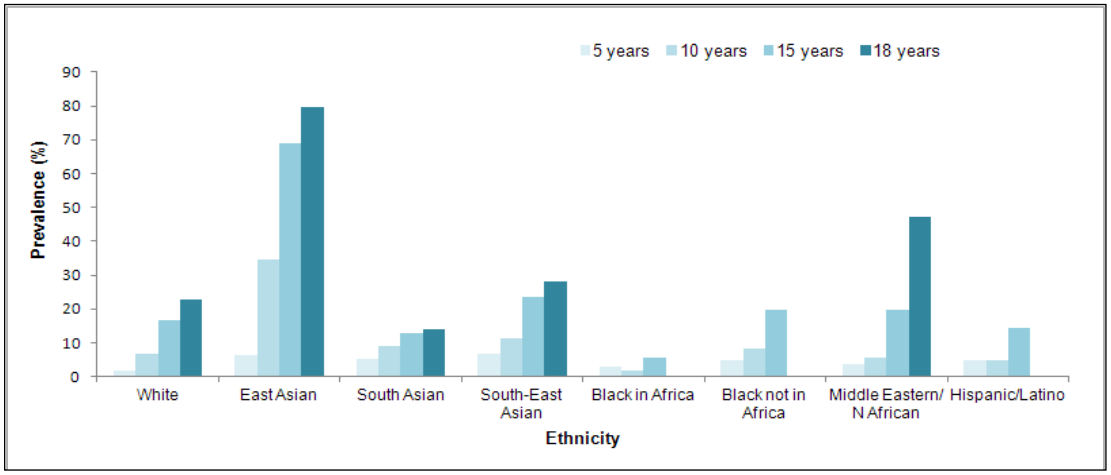


Figure 4. Prevalence of myopia in children by ethnicity and age

In all ethnicities there were no gender differences at the age of 5 years. However, by the age of 10 years girls had a significantly higher prevalence than boys which became more pronounced in White and East Asian children by the age of 15 years.

Comparison of data over time where there were enough studies, suggests that myopia is increasing slightly in White children, with a 23% increase over the last 20 years reported for East Asia. The global estimate for 2015 was that 312 million children were myopic which is projected to increase to 324 million by 2025 (Figure 5) (Rudnicka et al. 2016).

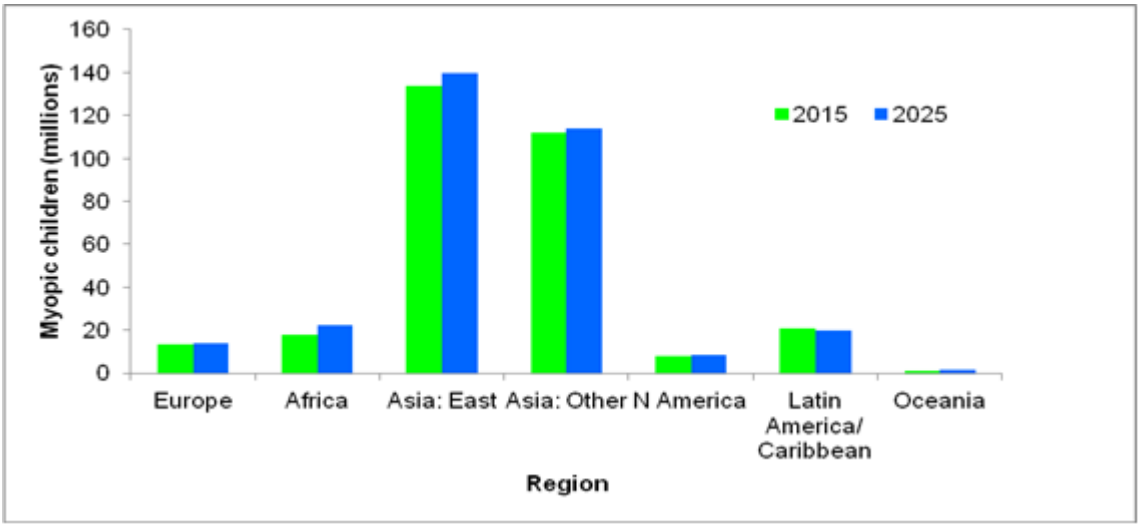


Figure 5. Regional estimates of the number of myopic children in 2015 and 2025

Hyperopia

A recent systematic review of the prevalence and distribution of hyperopia in children included 40 studies, 8 of which were conducted in Asia (Castagno et al. 2014). The definition used was a spherical equivalent of ≥+2.00D. The summary findings were that the prevalence declined with age, from 8.4% at the age of six years, 2-3% at 9-14 years and approximately 1% at 15 years. Most studies showed no statistically significant gender differences. Data are limited on ethnic variation, but suggest that Caucasians have a higher prevalence than African-American, Black and Asian (East and South Asia) children.

Astigmatism

In the eight RESC surveys, astigmatism was defined as a cylinder of ≥0.75D in either eye. The prevalence ranged from 10% in rural India to 42.8% in urban China. Most surveys report that the prevalence does not vary by age or gender.

Implications
As the prevalence and type of RE varies considerably between settings, decisions about school eye health programs should take account of the local epidemiology of RE in schoolchildren. The prevalence of myopia by age and region by Rudnicka et al. (2016), outlined above, is shown in Appendix 1.

Risk factors for myopia

The increasing incidence of myopia and high myopia globally, particularly in Asia, has stimulated intense laboratory, epidemiological and genetic research. Recent studies suggest that known genetic factors explain 35% of myopia (Guggenheim et al. 2000), and that education can potentiate these effects (Fan et al. 2014). Lack of time spent outdoors, parental education and myopia are other important risk factors, with a systematic review suggesting that there is a 2% reduction in the progression of myopia with every hour spent outdoors (Sherwin et al. 2012).

These complex relationships, together with the increasing body of evidence that intelligence is associated with myopia (Verma et al. 2015), makes interpretation of studies which explore the impact of correcting myopia on educational attainment very challenging.

Implications
In regions with a high prevalence of myopia, school health initiatives should encourage children to spend time outdoors, in play or sports several times a week. In addition to reducing myopia, outdoor activities may also improve physical health and wellbeing. The benefits of outside activities may have to be promoted to the Ministry of Education, educational practitioners, parents & students, who may all feel pressures for students to spend longer studying for exams in the classroom, especially in instances of performance related pay for teachers. Work must be done to demonstrate the value of good eyesight for students to all stakeholders.

Impact of uncorrected refractive error

Uncorrected RE

Uncorrected RE results in a blurred image (Figure 6). Evidence of the impact of uRE on children is limited, with several studies reporting that myopic children do not have worse quality of life scores than non-myopic children (Wong et al. 2009; Kumaran et al. 2015). However, a study in Mexico showed that children with poorer vision had significantly lower scores of visual function than children without uRE or who required minimum correction (Esteso et al. 2007).

Figure 6. How a woman's face might appear to a child with uncorrected refractive error (image on the right). *Photo courtesy of International Centre for Eye Health*

Impact of correction - positive

Although there is extensive anecdotal evidence of how providing spectacles improves children's lives (see below) published objective evidence is limited. In the Mexico study outlined above, spectacle correction improved scores of visual function in a dose response manner. Children who had presenting visual acuities of ≤6/12 before correction had significantly better scores in all domains (function, satisfaction, perception and symptoms) compared with children with better uncorrected visual acuity (Esteso et al. 2007). In cases where the blackboard is not of good quality, children will need better vision (Figure 7).

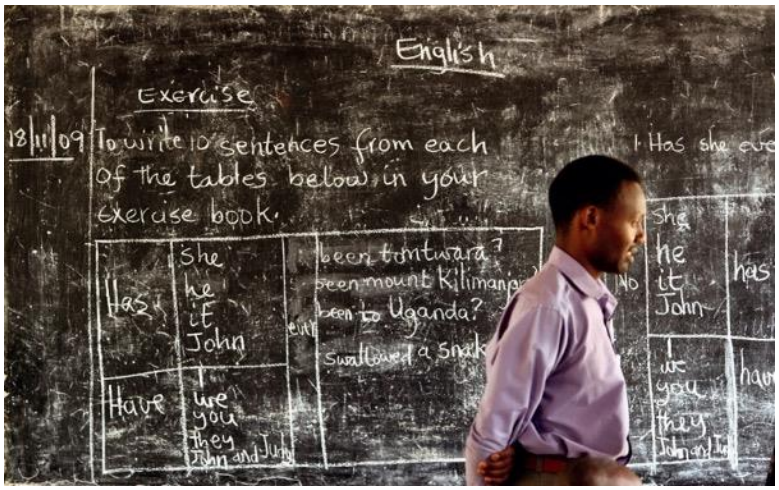


Figure 7. Children need better vision if the blackboard is not of good quality

Photo courtesy of International Centre for Eye Health

Although many children report that they can see and function better at school after receiving spectacles, the evidence of the impact of correcting refractive errors on academic performance is limited, mainly because studies to explore this are very challenging to undertake and interpret. However, one trial from China, does show improvement in maths scores, particularly in children given free spectacles, boys and in children who had better maths scores before they were given spectacles. (Ma et al. 2014).This is an area that would benefit from further research.

Case studies

Ruth (Figure 8) struggled with poor vision: “I felt upset that I couldn’t do the simple things that the other children could. My reading was so bad that I couldn’t make out simple letters.” After receiving her spectacles Ruth said “I feel like my prayers have been answered - I was feeling very angry with myself and depressed, but these glasses will help me do well and finally I can move forward in school. I won’t have to feel sad and upset anymore, and other kids won’t laugh at me.” Ruth was thrilled to receive her spectacles through the Seeing is Believing East Africa Child Eye Health program, saying “I can’t wait to start school and test out my glasses.”

Figure 8. Ruth received spectacles through Seeing is Believing programme *Photo courtesy of Brien Holden Vision Institute*

Figure 9. Rabi received spectacles through EyeFly program
Photo courtesy of Brien Holden Vision Institute

For years Rabi (Figure 9) had been unable to focus her distance vision, “I was unable to see the writing board in class clearly and I could not see properly at night.”

After receiving her new spectacles from the EyeFly program Rabi said: “I love my new glasses because I can see everything more clearly.” Her father, Arshad, was pleased at his daughter’s new-found joy in being able to do “anything at any given time.” Opening a door of possibility for Rabi, she is now a happy student given a new lease on life with improved vision and opportunities.

Impact of correction - negative

Only a few qualitative studies have been undertaken to assess barriers to spectacle wear amongst children. In a study in Tanzania, secondary students reported being teased, bullied and called derogatory names as reasons why some did not wear their spectacles, with comments such as “*I think people do not wear spectacles in class, because they worry about being laughed at*.”(Odedra et al. 2008)

Similar findings have been reported from other studies (Kumaran et al. 2015; Sharma et al. 2012) and others in India (Pavithra et al., 2014; Gogate et al. 2013), Chile (Von-Bischhoffshausen et al. 2014) China (Congdon et al. 2008), Mexico (Holguin et al. 2006), Oman (Khandekar et al. 2002), Saudi Arabia (Aldebasi, 2013), United States of America (Preslan, 1998). Parental disapproval is also quoted in some studies.

Implications
These findings show the importance of health education designed to reduce the stigma associated with spectacle wear and the benefits of correction among teachers, parents, normally sighted peers as well as children requiring spectacles. Offering affordable spectacles that are comfortable and appealing to children is also important. The importance of teachers and parents following up with children, to ensure they wear their spectacles, or replace where broken should also be emphasized

Other common eye conditions in Children

Trachoma

Trachoma is a potentially blinding condition if not treated adequately (Figure 10). The first stage of global trachoma control initiatives entails a detailed mapping of where trachoma is a public health problem. See the Global Trachoma Atlas http://www.trachomaatlas.org/. A map showing where active trachoma infection in children aged 0-9 years is endemic is shown in Appendix 3.

Figure 10. Trachoma in the later stages can cause in turned eyelashes and eventual loss of vision *Photo courtesy of International Centre for Eye Health*

Implications
School health initiatives should consider addressing active trachoma in areas where it affects 5% or more children, particularly in rural areas. This could entail ensuring adequate water supplies, checking that children have clean hands and faces when they attend school, and health education to encourage face washing.

Vitamin A deficiency disorders

Despite global efforts for control, VADD remain a public health problem among pre-school age children in many low income countries, particularly in sub-Saharan Africa and in parts of Asia (See Appendix 4). VADD can produce a variety of ocular signs, including Bitot's spots and corneal scarring (Figures 11 and 12).

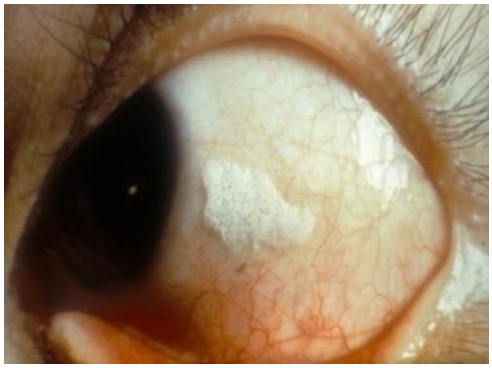


Figure 11. White deposit(Bitot's spot) on the eye is typical of vitamin A deficiency. *Photo courtesy of International Centre for Eye Health*

Implications
School health initiatives should consider addressing VADD in all countries where the prevalence is 10% or above, particularly in schools serving rural populations, through health education.

Cataracts in children

As corneal blindness decreases due to management of measles and vitamin A deficiency, cataracts in children has become of the leading causes of avoidable blindness in children (Gilbert, 2007).

Figure 12. Vitamin A deficiency can lead to corneal scarring with loss of vision. *Photo courtesy of International Centre for Eye Health*

Implications
There must be proactive case-finding and in some cases novel approaches like key-informants and primary eye care screening will need to be done. Parents must be educated on the condition and must understand the need for early intervention.

Eye conditions in teachers

More than 80% of adults aged 40 years and above have presbyopia, many of whom are likely to be un- or under corrected. This can have an impact on their ability to prepare and mark school work. Studies have shown that 66-81% of teachers have presbyopia, depending on the age range studied, and that 40-50% do not have correction. Coverage tends to be lower in younger teachers when the presbyopia is less severe. Barriers to presbyopic correction include lack of awareness, cost, no felt need or not a priority, cosmetic reasons, discomfort or broken spectacles (Idowu 2016; Ehlrish 2013; Kumah 2011).

Similarly, some teachers may also have myopia which either requires correction or re-checking of the current prescription to determine its suitability.

Since teachers, as adults, may have other eye problems, a school screening program should provide screening of teachers for presbyopia or other refractive errors, and advise/refer them to the next appropriate level of referral in case for assessment of problems. Two examples of eye problems, other than refractive errors that may occur in adults, are presented below.

Diabetes is increasing in all regions. Up to 10% of people living with diabetes have sight threatening retinopathy that they are not aware of as this can be asymptomatic at the earlier stages. (See Figure 13)

Figure 13. Normal healthy retina (L). Changes in the retina from diabetic retinopathy (R). Urgent treatment can maintain vision.
Photos courtesy of International Centre for Eye Health

Glaucoma affects 4-5% of adults aged 40 years in African and Asian countries. (See Figure 14)

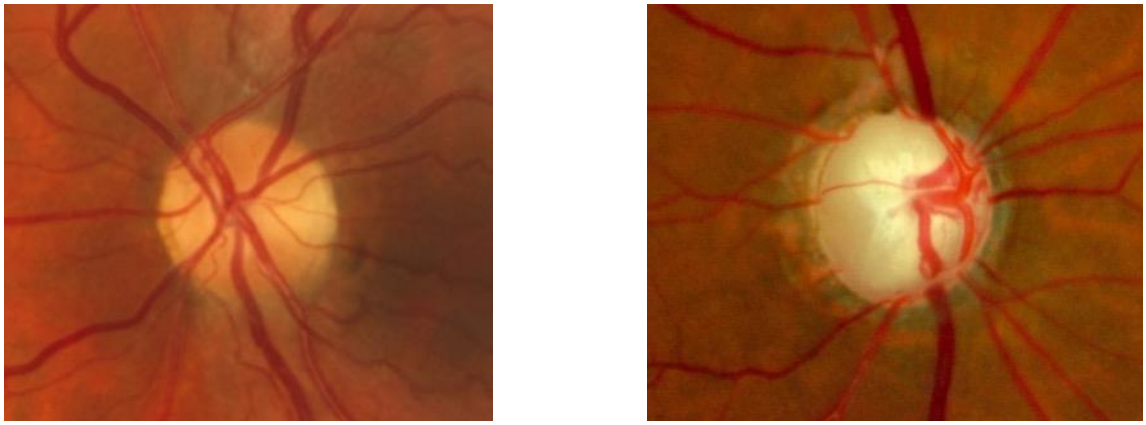


Figure 14. Normal optic nerve (L). Glaucomatous optic nerve (R). *Photos courtesy of International Centre for Eye Health*

Implications:

All school health initiatives should include the eye health of teachers with approaches that take account of the resources available.

Chapter 3 - Comprehensive school eye health

This section highlights some of the challenges in current school eye health initiatives and provides a framework in which school eye health is integrated into a school health program. Case studies are provided to emphasise the integrated approach.

Challenges of current school eye health initiatives

Many school eye health initiatives are narrow in focus, do not involve Ministries of Health or Education, are not integrated into other school health initiatives and do not provide annual or biannual vision screening to identify new cases and to follow-up children already identified with myopia which can progress with age. These factors can lead to poor co-ordination, ownership and sustainability. Other areas that are often not adequately addressed include lack of standard approaches to screening, prescribing, referral and follow up. Inadequate monitoring and evaluation can lead to inefficiencies and poor assessment of outcomes and impact. Ministries of disability can also be a key partner in school eye health programmes, as many are responsible for schools for children with disabilities, or schools for the blind, or can have details of children who do not attend school due to a disability.

There is evidence that a high proportion of children given spectacles do not wear them for a range of reasons (Morjaria et al. 2016; Congdon et al. 2008; Pavithra et al. 2014), many of which could be minimized or overcome by health education of parents, teachers, affected children and their peers, by only dispensing spectacles to children who really need them, and ensuring comfortable, cosmetically acceptable frames are provided free of cost or at a minimal cost (Table 2).

Table 2. Spectacle wearing rates among children in school vision programs

Country	Reference	Age (yrs)	Follow up (months)	Outcome			Factors associated with wear
Mexico	Castanon 2006	5-18	4-18	Wearing Have at school Overall	13% 34% 47%		Poor VA; higher RE; rural; older children
Tanzania	Wedner 2008	12-19	3	<u>Free</u> Wearing Have at school Overall	 31% 15% 46%	<u>Prescription</u> 16% 10% 26%	Poor VA; myopia; free spectacles
China	Congdon 2008	11-17	3	Owned Did not own	39% 18%		Poor VA; higher myopia; females; older
Oman	Khandeka 2002	6-17	12	Wearing Have at school Overall	61% 19% 80%		No data
South India	Pavithra, 2014	7-15	3	Wearing	58%		No data
North India	Gogate 2013	8-16	6-12	Wearing Have at school	30% 2%		Spectacles lost, broken, at home, dislikes wearing them
USA	Preslan 1998	4-6	12	Wearing	30%		No data
Saudi Arabia	Aldebasi 2013	7-13	6	Wearing	33.2%	Add	Parental disapproval; spectacles broken, cause headaches dislikes wearing them

Most programs do not address the eye health needs of teachers, nor those of pre-school and non-school going children.

Many of these aspects are addressed in these guidelines.

Strategies for control of visual loss in children

A range of strategies are required to control visual loss in children (Figure 15), from health protection and health promotion through to tertiary prevention.

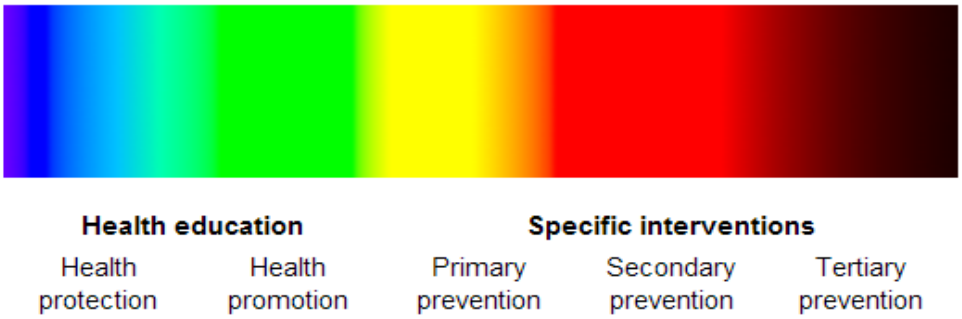


Figure 15. Strategies for control of visual loss in children

The purpose of health protection and health promotion are to promote safe and healthy behaviours, through policies, and other components of a health education strategy. For example, this may entail nutrition education to promote vitamin A rich foods, or legislation which bans selling fireworks to children. The purpose of primary prevention is to reduce the incidence of new cases of potentially blinding conditions, which may entail specific measures such as measles immunization and vitamin A supplementation. Secondary prevention refers to interventions which prevent the blinding consequences of a condition, such as early detection and treatment of corneal ulcers in children, or lid surgery for someone with lid changes in trachoma. Tertiary prevention has two components: treatment which restores function, such as cataract surgery and spectacle correction of REs, and interventions which improve function where sight cannot be restored i.e., low vision services and rehabilitation.

An ideal school eye health program should engage Ministries of Health and Education, be integrated into the broader school health program and must be backed up by eye and child health services to manage referrals. As the key developers of policy, Ministries of Health and Education are crucial partners if school eye health initiatives have the aim of scaling up activities at the National level e.g. through developing school screening guidelines or integrating work into teacher training. The following components, which encompass strategies for control of visual loss in children, are recommended, using “Promoting Healthy Schools” framework:

Formal health curriculum:

This could entail the following:

- Eye health promotion; i.e. health education and literacy, empowerment, increasing awareness regarding eye health and its implications. An example of an eye health promotion poster is shown in Appendix 15.
- School nurse training specifically includes eye health in children.
- The structure and function of the eye, and how children can keep their eyes healthy is included in primary school curricula.
- Gaining support from local education authorities, School inspectors and Head teachers, as they are responsible for monitoring the performances in schools, and so their support is crucial to ensure activities take place and are successful.

Ethos and school environment:

Healthy practices e.g. personal hygiene – soap and sinks with access to clean water, provided for face and hand washing for trachoma control.

- Promote a healthy school environment e.g. growing vitamin A rich foods in school gardens; water collection for face washing; clean latrines and waste management for fly control.
- Promote uptake of programs for locally endemic diseases especially those targeted for elimination e.g. trachoma, and conditions of public health significance e.g. vitamin A deficiency.

Engagement with families and/or communities:

- Use the Child-to-Child approach to take eye health messages home as agents of change and train children as "case detectors" of individuals in their families or community who need eye services.
- Screen siblings of children with RE and other familial conditions.
- How to help and interact with other children and adults who are irreversibly blind or have low vision.

Specific eye care activities:

- Identification of children with visual impairment.
- Correction of RE using high quality spectacles that are acceptable, durable, comfortable and affordable.
- Primary management of common and acute cases, e.g. lid infections, conjunctivitis, trauma.
- Identification, referral and treatment of potentially visual impairing conditions e.g. cataract.
- Teachers' eye health such as correction of presbyopia and referral for retinal examination if diabetic.

See Appendix 5 for a schematic representation of some of the components of an integrated school eye health program.

Case studies

Case Study 1. Engaging Ministries of Health and Education in Pakistan

Integrating and aligning eye health into existing health and education systems has been achieved in Pakistan by working with government and non-government partners so that services are available and accessible to all children, with a particular focus on girls. An initial demonstration took place in partnership with District Health and Education departments and Al Ibrahim Eye Hospital in 2011 in Malir, Sindh Province.

The goal of the program was *to improve the quality of life and educational performance of children attending primary and secondary education through health promotion, education and elimination of vision impairment and ocular morbidity*. The program, which was implemented in primary, secondary and higher secondary schools and informal education centres during vacation periods, was led by a community ophthalmologist, optometrist, and community mobiliser from Al Ibrahim Eye Hospital.

The program also partnered with the Department of Special Education and Social Welfare so that eye services were provided ~~t~~o all children enrolled in special education centres, which included provision of low vision devices when required.

The strategies used in the program included:

- Building the capacity of teachers and school support staff in primary eye care and vision screening;
- Eye health assessment in schools with follow-up management systems;
- Engaging Parent Teacher Associations and children to act as agents for change;
- Active engagement with other health and nutrition initiatives and community based organizations;

- Development of health promotion materials in the local languages delivered by the local team to reinforce positive behaviour change in schools and communities;
- Research to understand factors associated with spectacle wear.

The program ensured that the right services were in place to meet the needs and expectations of children and their families and that more intensive support was given to the most vulnerable.

The program ensured integration of eye health services into existing health and education systems by ensuring the active participation of the education and health departments, professionals, private organizations and communities whose support ensured continuity of the program after the financial support ended. Based on the learning and success of the project, the second phase has been initiated in partnership with the Department of Health and of Education, Government of Azad Jammu & Kashmir (AJK). The program started in January 2016 and will provide services to children enrolled in formal and informal education systems by 2018.

The institutionalization and sustainability of the school child eye health initiatives were achieved by:

1. A situation analysis of health-related activities in the education and health systems;
2. Identifying actions needed at different levels e.g. at central, provincial, divisional, district and sub-district levels;
3. Engagement and interaction with decision makers at different levels;
4. Strengthening the leadership capacity of health and education officials to ensure ownership.

Case Study 2. Training teachers in China

In China the prevalence of myopia is escalating at an alarming rate, calling for urgent action. In Shanxi, children's eye health was often neglected due to a lack of understanding of the importance of eye care or lack of access to care. With support from Standard Chartered Bank, the Brien Holden Vision Institute worked with three international eye care NGOs and local partners to establish a sustainable eye care system (the "CHEER" project) to provide eye and vision screening, refraction, diagnosis and referral.

Teachers were trained to deliver health education and were provided with materials. They were also trained in simple eye examination to detect poor vision and eye conditions such as red eyes, corneal opacities, strabismus, ocular trauma and ptosis, with guidelines on which children to refer. Teachers were also trained in vision screening. Campaigns were held to increase public awareness.

Figure 16. Ms Zhao, a teacher in Yangcheng, Shanxi Province examining a child's eye and visual acuity screening - Photo courtesy: Brien Holden Vision Institute

Ms. Zhao (Figure 16) said, "I learnt that about 15 out of 80 students in grade five and six have myopia. I was also aware of the progression of myopia and how it can significantly increase the risk of blinding diseases. Now that I have learned to perform vision screening and have a better understanding of common eye conditions, I can provide my students with the help they need."

Case Study 3. Vision Champions in Bariadi, Tanzania

The Child-to-Child approach is based on the philosophy that when children work together they can change their world. Delivering health messages is a key component of Child-to-Child and in this project messages were delivered by "Vision Champions" who were trained to share eye health messages and conduct simple vision screening among family members and peers.

First, interviews were conducted with community members to find out whether Vision Champions would be acceptable. The community thought the Child-to-Child approach to be a good idea, that children could improve the eye health awareness in the community and that children would be accepted by everyone as they are part of the community. However, some thought that children might not be believed or may be ignored as they are too young, or that parents might stop their child from participating. They recommended that village administrations, leaders and parents be involved in the planning and training and that supporting materials should be provided.

Second, a knowledge, attitude and practice study was undertaken among over 1,000 community members to explore what they knew and did about eye conditions. This was repeated three months after the Vision Champions visited the community.

Over a three month period, 120 Vision Champions aged 11-12 years from 10 schools were trained. They shared their stories with 6,311 people, screened the vision of 7,575 people and referred 2,433 people for further care, 460 of whom attended. 338 people received glasses and 106 people were identified with cataract, 61 of whom attended follow up and 23 people received surgery.

At three months, community members were more aware that keeping faces clean and measles immunization can prevent blindness. They were also more aware that incorrect use of eye ointment and cataract can cause blindness and had learnt that measles, malnutrition, red painful eyes, onchocerciasis, HIV/AIDS and diabetes can lead to blindness. Community members were more aware that they should not use medicines that were out of date nor rub their eyes after injury because it can worsen the condition. The community felt that all children should have their eyes tested and reported that poor eyesight can be improved with management.

Case Study 4. Evidence based policies to support school eye health in Cambodia (World Economic Forum, 2016)

In Cambodia a collaboration between NGOs and the Ministry of Education on a school eye health pilot led to the integration of eye care into the national Ministry of Education's comprehensive school-based child-health program, scale-up of the pilot model, and eventual replication in Ghana, Ethiopia, and Senegal. The Global Partnership for Education (GPE) recognized the opportunity for school-based eye care after the completion of a national prevalence study of disabilities and impairment among children, which was conducted by the Ministry of Education with technical assistance from Handicap International Belgium and GPE's support. A key finding was that many children who dropped out of school, or who had never enrolled, had poor vision.

The GPE launched the pilot in 2012 in partnership with Cambodia's Ministry of Education, the World Bank, Sightsavers, Partnership for Child Development (PCD, Imperial College London), and the Fred Hollows Foundation. In conjunction with the Ministry's existing school-health interventions, the pilot worked in 56 schools in urban and rural settings in Siem Reap province, training teachers to conduct vision screening at the 6/12 level. Training lasted one day. Children who failed screening were examined and refracted by a team of visiting eye health workers. Ready-made spectacles were provided immediately to 31/44 children (70%) with simple REs who did not need customized spectacles.

Children requiring customized spectacles (13/44) received them within days of refraction. 13,175 students and out-of-school children age 11-15 years were screened, 57 of whom failed screening and were refracted. 44 children were given spectacles. At a six month follow up 40 of the children given spectacles were reviewed: 34 children had their spectacles at school and 20 were wearing them. Children with myopia and higher degrees of hyperopia were more likely to wear their glasses.

Vision screening by teachers was compared with that of trained eye health workers, which found 100% agreement. This demonstrates that teachers can reliably screen the vision of children. The evaluation also found that delivering spectacles to children within a matter of days was an effective approach to maximizing adoption and use.

During vision screening of children some teachers asked to be screened, which was undertaken, as improving the quality of education requires teachers with good vision. In addition, teachers wearing spectacles are role models which encourages students to wear their spectacles. Screening teachers is recommended for future school vision screening.

Data from the pilot were given to the Ministry of Education who incorporated the model into its new five-year national Education Strategic Plan a year later. The Fred Hollows Foundation was engaged to provide technical assistance for vision screening in 3 provinces. In addition, in February 2016 the Ministry of Education launched National Operational Guidelines for School Vision Screening in collaboration with the Ministry of Health, the National Program for Eye Health, the Brien Holden Vision Institute and the Fred Hollows Foundation.

To ensure affordability, scalability and impact, GPE and the World Bank supported the launch of the School Health Integrated Programming (SHIP) project in 2016. Sightsavers, PCD, and the Fred Hollows Foundation assisted the Ministry of Education to scale up vision screening activities in Cambodia and support them to integrate different school health interventions such as vision screening and deworming in a holistic and cost-effective manner.

The SHIP initiative was also introduced in three countries in Africa: Ethiopia, Ghana, and Senegal. Given that an enabling policy environment is a prerequisite for scaling up and sustainability, SHIP's approach involves "catalytic training and learning as a precursor for any on-the-ground action." The Global Partnership for Education through the World Bank has engaged multi-sector stakeholders, including local donor groups from 15 countries in Africa and Asia in workshops to promote and increase government ownership.

Case Study 5. Successful advocacy for SEH

Peek uses smartphone-based vision tests (figure 17), vision simulations, automated text and voice messaging and a tracking system to follow participants through all the stages of a school eye health program. The acuity app has been validated (Bastawrous A, 2015) and the system has undergone trials in Kenya and India. In the trial in Kenya 21,000 children were screened by 25 teachers in 9 days, and 900 children identified with visual impairment were referred to the eye department. There was a three-fold higher uptake of referral in children in schools randomized to Peek compared with a standard program. The program has since been scaled to a countywide program reaching 300,000 children. The trial in India added triage and follow-up after treatment to allow real-time measures of outputs and outcomes and shed valuable light on bottlenecks in the health system pathway. A successful district pilot study in Botswana, which included economic modelling of scaling up and a business case, has led to a government led, government funded national school eye health program in which every school child (and teacher) will be screened and treated by the end of 2020, ensuring an entire generation of school children receive access to eye health.

Figure 17. School screening using Peek in Kenya. Photo courtesy Peek Vision

Chapter 4 – Steps in planning school health

A simplified step by step guide for planning a school health program. However, this will depend on the local context and resources available; and whether the services are starting from scratch or expanding on existing services.

Step by step approach in developing a school eye health program

Step 1	Establish the need
Step 2	Situation analysis of policy, programs and resources for refraction and eye care
Step 3	Engagement with health and education authorities
Step 4	Situation analysis of school education system
Step 5	Determine the Goal of the program
Step 6	Gap analysis
Step 7	Develop a plan with short, medium and long-term objectives and indicators
Step 8	Establish formal partnerships
Step 9	Identify and secure resources
Step 10	Develop Standard Operating Procedures
Step 11	Develop a monitoring framework and plans for review and evaluation
Step 12	Pilot the program in a defined setting or area
Step 13	Management and governance
Step 14	Program implementation
Step 15	Monitoring systems and evaluation

Step 1: Establish the need

A. For services for refractive errors in children

The need can be established using the following approaches.

- Review existing literature to estimate the prevalence and type of RE (See Appendix 1). This can be confirmed by testing the vision of 200 children in each of the following age groups 5-8 years, 9-10 years (primary school) and 11-15 years and 16-18 years (secondary / middle school). It is recommended that uRE is defined as an inability to see 6/9 in BOTH eyes and whose vision improves to normal with refraction for this exercise (see section 1 in Chapter 5: Guidelines for Implementation). Refraction of children who fail will give the % with RE who might benefit from spectacles (see below) by age group.
- Obtain information from other local school eye health programs
- Undertake a formal population-based survey. However, these are expensive and time consuming, and may not reflect the findings in school going children. For example, children who are multiply impaired, who have a higher risk of RE, may be excluded from school.
- http://www.trachomaatlas.org/ (Appendix 3)
- What is the prevalence of vitamin A deficiency in preschool age children? (map in Appendix 4)

Conditions likely to affect teachers

- What proportion of teachers are aged 40 years and above, who are likely to be presbyopic and require spectacles for near vision?
- What is the prevalence of diabetes amongst adults aged 40 – 60 years? (Appendix 6)
- Consult the International Diabetes Federation Atlas for country specific estimates http://www.diabetesatlas.org/resources/2015-atlas.html.
- What is the prevalence of glaucoma among adults aged 40 – 60 years?

Step 2: Situation analysis of policy, program and resources

A. Policy

- Is child eye health included in national prevention of blindness plans?
- Are refractive errors in children included in other government policies, and if so, is there a budget?
- Are there insurance schemes or formal private-public partnerships which include eye conditions of children?
- Are there policies regarding engaging teachers in health programs?

B. Programs for school health

- Is there an existing school health program? If so, is eye health included? Is there a budget?
- Is there any existing relationship between the school and local health providers (public or private)?
- Do all schools have a school nurse? Or do specific teachers take on any school health responsibility (e.g. Physical Education teachers).
- Are other organisations already active in school eye health in the planned area?
- Are there other school health initiatives that eye health could be integrated into? e.g. deworming programs, dental programs
- Does school health education include eye health?

C. Resources for refractive errors and other eye conditions

The next step is to conduct a situation analysis to ascertain the following (see Appendix 6 for data collection tools):

For eye care

- At tertiary, secondary and primary level for medical and surgical care, prescribing and dispensing spectacles, low vision care, and for the detection, diagnosis and management of diabetic retinopathy.
- The assessment should use the building blocks of the health system (see below).
- The standard list of the equipment required at each level of service delivery is in Appendix 8.

Different levels of the eye care health system are shown below (figure 18).

For children with low vision or who are blind

➢ Special or integrated education for children with irreversible causes of low vision or blindness, social welfare services, organizations of and for the blind

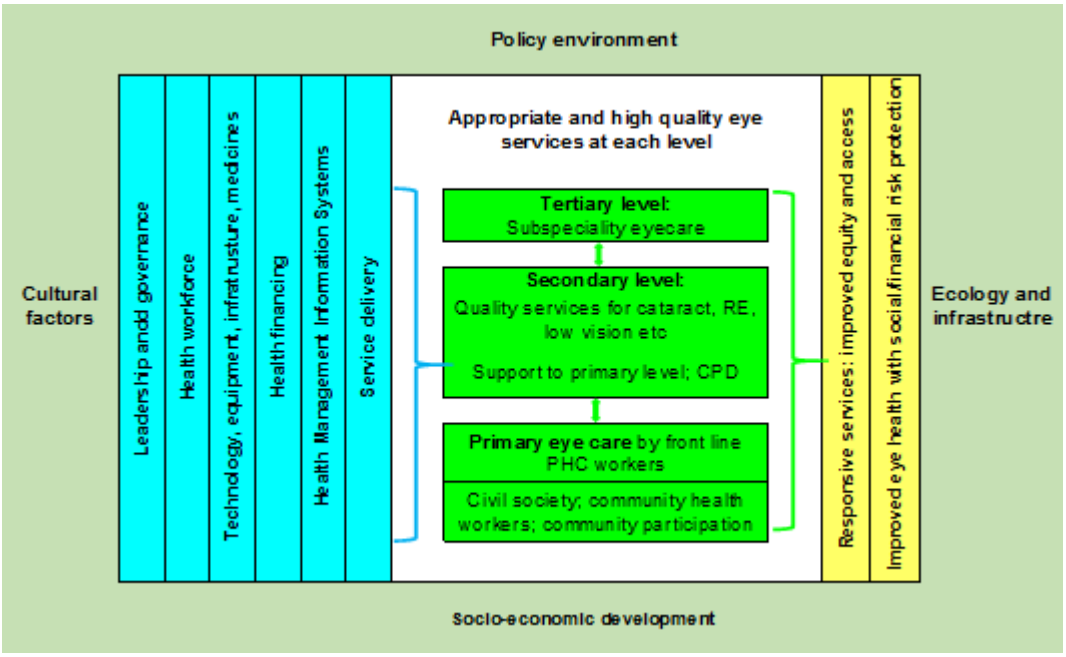


Figure 18: Building blocks and levels of service delivery, and the desired outcome of a health system

(Gilbert, adapted from WHO)

Step 3: Engagement with health and education authorities

Active engagement of State / District Ministries of Education and Health is critical. Engaging with the Ministry of Disability should also be considered. The process of sensitisation should start early in the development of the project concept. National and sub-national governments and their administration structures are very sensitive to health or education initiatives being undertaken by non-state actors without their knowledge and approval. It is vital to actively engage with the health and education authorities at the outset to develop a joint conceptualisation of the 'school eye health project or initiative' and determine areas of synergy with ongoing government initiatives. Further, the interaction with the health and education authorities lays the foundation for a well-coordinated collaborative effort, which is likely to receive more facilitation and support from the authorities and so be more sustainable. For example involving local education authorities and school supervisors can result in activities being monitored through their own standard school monitoring system.

There is an increasing trend in many countries to launch programs for Inclusive Education (IE) and Early Childhood Development Education (ECDE) as part of the education sector plans. Engagement with the education authorities would also help identify opportunities to develop and strengthen capacities to incorporate school eye health in ongoing inclusive education and ECDE initiatives.

Step 4: Situation Analysis of school education system

This is another critical step in the whole process It involves finding out more about the educational structure, key stakeholders at various tiers of the education system at national and sub-national levels, education information flows, curriculum development mechanism, and in-service teacher training programs. Further, strategic integration points should be determined for school eye health in existing school health and nutrition programs where they exist. It is important that parents are engaged and informed about school eye health programs. Parent teachers associations are the ideal platform to facilitate this.

Involving Head teachers in an eye health initiative can be crucial to the success, as Head teachers are ultimately responsible for providing quality education to their students, can ensure teachers conduct activities as agreed

and can support quality monitoring. They can also be great 'champions' by promoting the importance of good eye health to the school and local community.

In the proposed program area, request the Ministry of Education to generate lists of schools and identify schools with and without programs for eye health to avoid duplication

Determine term times, including end of year date, examination dates, holidays and local languages.

Step 5: Determine the Goal of the program and delineate the causal pathways to achieve the goal

Having established the needs and available resources decide on the Goal of the program i.e. the positive change that would come about as a result of successful implementation of the program. It is very useful at this point to construct a Theory of Change which describes the outcomes which would feed into the Goal, and the inputs and outputs required to achieve each outcome. An example of a Theory of Change is shown in Appendix 8.

From the Theory of Change it is possible to identify potential barriers, and assumptions. For example, potential barriers may be that Head Teachers do not permit their teachers to screen, or parents refuse to have their children's eyes tested. Assumptions might include that an adequate supply of suitable spectacle frames will be maintained; screeners will be willing to spend time screening and will maintain high standards; the local paediatric ophthalmologist will stay in post.

Step 6: Gap analysis

For each component of the program identify gaps that need to be addressed to ensure appropriate implementation. This could include training existing cadres to measure vision or to refract, prescribe and dispense spectacles for children. Individuals may need training in low vision care for children and access to supplies of appropriate devices; local clinical staff may require training in detecting sight-threatening diabetic retinopathy; school nurses may require orientation and health education materials for eye health in children.

Step 7: Develop a plan with short, medium and long-term objectives and indicators

For each outcome it is useful to define short, medium and long term SMART objectives, with activities and indicators (see section C on monitoring and evaluation).

Objectives

For each outcome, objectives and activities need to be delineated. Objectives must be SMART i.e., Specific, Measurable, Attainable, Relevant and Time Based (Figure 19).

Figure 19. SMART objectives.

Examples of short term objectives could be training core cadres in refractive services and providing the equipment required; providing equipment for eye care in the referral hospital; awareness raising workshops for eye care professionals and including an eye health component into existing training programs, e.g., for paramedics and nurses. Medium term objectives may include establishing refractive services and networking of service providers. Long term objectives could entail ensuring that eye health is included in school health curricula, that optometry and ophthalmology continuing professional education specifically includes management of children, for example.

The ultimate aim is that services for refractive errors in children are fully integrated into a national comprehensive eye care program. This will require robust evidence of the costs and benefits of school eye health, and advocacy.

Key elements to consider in planning:

Provision of spectacles: An efficient mechanism must be in place to procure affordable, high quality spectacle frames and lenses. Spectacle frames should be acceptable to boys and girls of different age groups and be of the correct size. An inventory of frames and lenses must be in place, with a large enough stock at all times to meet the demand.

Referral mechanisms and tracking update of referral: Children whose vision does not improve with refraction should be referred to specific eye hospitals or departments with the capacity to manage them. It is important to track whether these children attend following referral and systems should be in place for this. This may entail using referral slips and a register at the hospital, or electronic systems could be used.

Step 8: Establish formal partnerships

Before implementation starts it is advisable to obtain Memorandums of Understanding (MOUs) with the Ministries of Education and Health, and to hold a District level workshop of relevant stakeholders for advocacy and sensitization

Step 9: Identify and secure resources

To promote sustainability comprehensive school eye health programs should ideally not require extensive additional external resources. However, in the short term, additional resources are usually required for training, to produce materials and ensure supplies of high quality spectacle frames and lenses.

The different components of the plan (short, medium and long term) should be costed and funding sought from the government, non-governmental organizations, community based and service organizations and commercial enterprises willing to support program.

Step 10: Develop Standard Operating Procedures

Standard Operating Procedures (SOPs) are highly desirable to ensure that activities are implemented in a uniform, consistent and a high-quality manner. Standard Operating Procedures provide a step by step guide on who should do what and how. For school eye health SOPs should cover many of the aspects covered in this guideline, from engagement with Ministries of Health and Education, sensitization of Head Teachers through to how to train screeners and refractionists; how to prescribe spectacles for children; who, how and where to refer and track referrals (including teachers with diabetes) etc. The SOPs should also include data to be collected for monitoring. The SOPs provide a benchmark against which the competencies and activities of those involved in the program can be monitored.

Step 11: Develop a monitoring framework and plans for review and evaluation

A monitoring framework is required, which lists each indicator and how it is defined; the source of information; who is responsible for gathering / proving the data and the frequency of reporting. A list of potential output, outcome and impact indicators are shown in Appendix 10a and a flow diagram is shown in Appendix 10b.

At the outset plans should be made for a midterm review, and an end of project evaluation. A budget line should be specifically allowed for these activities.

Step 12: Pilot the program in a defined setting or area

Pilot testing the different elements of the program is very useful as it can identify barriers, assumptions or other problems which limit implementation. The pilot could be done in a district with a secondary level eye unit with optical services and an educational institution willing to participate. Access to a tertiary eye department for referrals and community-based eye health program in the area are added advantages.

The SOPs may need to be modified after the pilot.

Step 13: Management and governance

All programs regardless of their size and complexity will need to be well managed. Managers with clearly defined roles and responsibilities should provide oversight of implementation, and manage the financial, human and other resources. Managers will be responsible for reporting on progress and for financial accountability to donors, Ministries and other stakeholders. Managers are also usually responsible for initiating midterm reviews and end of program evaluations.

The overall processes and procedures of the program will have to be governed in manner that ensures the provision of quality eye health services to children in a way which promotes equity.

Step 14: Program implementation

In each school it is advisable that the Ministry of Education be asked to identify school head teachers who would participate in the program. The head teachers are a vital link to any school related interventions and they must be brought on board at an early stage of the program. This may entail capacity building of head teachers to support and supervise the school eye health initiative in their respective schools. Further, the Ministry of Education through the head teachers can identify two contact teachers, in each participating school, who will be trained to assist and coordinate screening. For large programs, it is advisable to have a District level liaison teacher who co-ordinates with the contact teachers.

Suggestions for the roles and responsibilities of individuals who might be involved in a school eye health program are shown in Chapter 6 of these guidelines.

Step 15: Monitoring systems and evaluation

All countries with education sector plans have a monitoring and evaluation framework with key performance and monitoring indicators. Engagement with education authorities would help identify some monitoring indicators used in the education statistics that could be adapted for use in the school eye health program. This would ensure that school eye health data feed into and are reflected in education statistics.

Progress of the program should be monitored on a regular basis to ensure that it is meeting targets. Monitoring should be conducted by the program implementers. Reporting of indicators (see Appendix 9a) for monitoring should be built into the SOPs. The program should also be reviewed periodically to ensure screening accuracy, referrals, retention of spectacles, spectacle wear, maintenance of records, and referral attendance rates amongst other things.

Below is a worked example of how data can be used to monitor a school eye health program. In this setting 4% of school children have a significant uncorrected refractive error. If the target is to screen 10,000 children this means that 400 need spectacles. Monitoring data shows that 8000 children were screened, and 640 (8%) failed screening. Only 384 (60%) of these children attended for refraction, 154 (40%) of whom had normal vision on retesting. The remaining 230 children were given a prescription for spectacles. At follow-up 115 (50%) had obtained their spectacles but only 35 were wearing them. 28 of these children were satisfied with their spectacles.

Actual need		
Total number of children	10,000	
4% have significant RE	400	need spectacles
Monitoring data		
Total number of children	10,000	
80% screened	8,000	
8% fail screening	640	
60% attend for refraction:	384	
40% normal vision on retesting	154	
60% given prescription for spectacles	230	
Outcome data		
50% obtain their spectacles	115	
30% wear their spectacles	35	wearing spectacles
Impact data		
80% report better vision	28	satisfied with specatcles

These data should immediately raise concerns and questions. The coverage of the program was only 80% - reasons need to be explored and possible solutions considered. For example, returning to the school on

another occasion might enable some of the 2000 children who did not attend initially to be screened. The high rate of false positives (i.e., normal vision on retesting) shows that the screeners need to be re-trained. Only 50% of children needing spectacles obtained them. This is a serious shortcoming. Reasons need to be explored, which would entail interviewing some of the parents. Solutions should be based on what parents report, would might include dispensing as many spectacles as possible in schools; subsidizing the cost for poor families; increasing awareness amongst parents of the benefits of spectacle wear. At follow-up only 30% of children who obtained their spectacles were actually wearing them. Children should be asked why this was the case, and some of the common reasons are as follows:

- discomfort
- they do not like the appearance of the frames
- there is no improvement in vision
- they are teased by their friends
- their parents do not want them to wear their spectacles

Again, solutions should be based on what the children say and might include a pilot study to find out which frames children prefer; ensuring an adequate stock of the correct frame sizes; improving dispensing, and health education for parents, teachers and all children in the school.

A similar process should be gone through to monitor uptake of referrals. Research can also be conducted to assess the barriers to children taking up services and so strategies to increase referral uptake developed. Research on the project can also be useful if the aim of the project is to 'scale up' services, either through providing guidelines to be taken on Nationally, or for eye health to be included in teacher training in the future.

Chapter 5 – Guidelines for implementation

This section provides recommendations on

1. Detection and management of refractive errors in children:
   - Frequency of child vision screening in different age groups
   - Screening: visual acuity cut-off for screening and screening charts
   - Who should screen
   - Refraction
   - Prescribing guidelines for children
   - Referral mechanisms
   - Referral to low vision services and for special education and rehabilitation
2. Detection and management of other common eye diseases in children
3. Teachers eye health
4. Control of locally endemic eye diseases in children
5. Child protection
6. Cultural considerations

Detection and management of refractive errors and other eye diseases in children

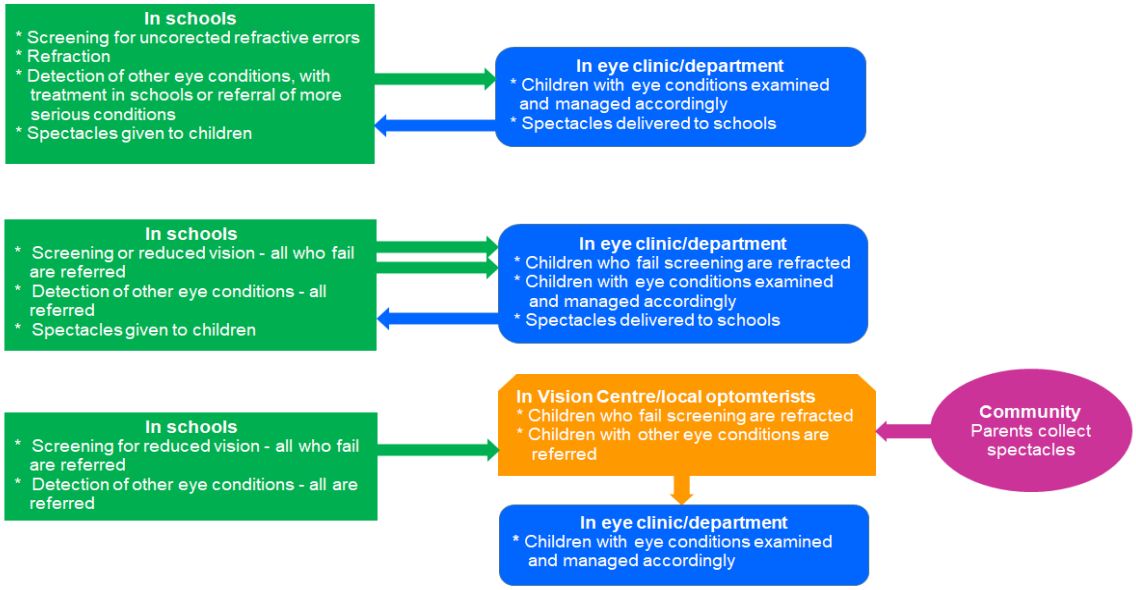


Figure 20. Models of service delivery

Frequency of child vision screening in different age groups (Table 3)

As myopia usually starts during late primary school age, and in some children, progresses over time, schools should be visited every 1-2 years. The frequency of visits may need to be adjusted for the local context, for example in contexts with high annual incidence of RE amongst older children.

Table 3. Recommendations for years 1-3 of implementation:

	Age group	
	Primary (5-10 years)	**Secondary (11-18 years)**
Year 1 of implementation	Screen all children for • reduced distance visual acuity • red eyes • white pupils • strabismus	Screen all children for • reduced visual acuity • red eyes
Year 2 of implementation	Screen new intake only for • reduced visual acuity • red eyes • white pupils • strabismus AND re-examination all children given spectacles the previous year	• Re-examine all given spectacles the previous year and those where teachers have concerns • Screen the new intake in the first year of secondary school, as for Year 1
Year 3 of implementation	As for year 2	As for year 1

Screening: visual acuity cut-off for screening and screening charts

Visual acuity charts

Vision screening should use only one row of optotypes at the 6/9 (approximately 0.2 logMAR) level at the appropriate test distance (minimum of 3 meters). High contrast black on white should be used (figure 21), with a dark surround (see below) which improves reliability when only using one row of optotypes. The child's responses are observed during screening (figure 22).

Figure 21. Optotypes used for vision screening

Failure of screening is defined as a child sees 3 or less of the 5 letters.

Important: if other charts are used the manufacturer's instructions must be followed which define failure at the 6/9 level.

Use more than one chart, as children can remember very well, and rotate the chart between eyes.

Mobile phone applications

Only mobile phone applications that have been validated in children at the 6/9 level should be used.

Screening for hyperopia

There is no internationally agreed consensus on whether or how to screen children for hyperopia. However, where resources permit and there appropriately trained eye health personnel are available, visual acuity can be measured with the child wearing a pair of +2.00 D glasses. A child with

significant hyperopia will still be able to pass the 6/9 screening chart with the +2.00 D glasses on. In this case, they should be referred for further refractive care.

An example of a Clinical Vision Screening Protocol can be found in Appendix 11

Note: not all children who fail screening will require spectacles. Some may have minor REs and others may have other ocular pathology.

Figure 22. Measuring visual acuity during vision screening.
Photo courtesy of Brien Holden Vision Institute

Who should screen

Screening can be undertaken by health care professionals or non-health care personnel who have been trained and who have demonstrated high levels of competency in all the steps involved (i.e., gives adequate explanation; asks the child if they already wear spectacles; ensures adequate lighting and test distance; tests each eye separately; correctly records the findings as pass or fail for each eye), and interprets the findings correctly and identifies children who require refraction.

Trained teachers or school nurses are recommended as screeners, as this is cost effective and builds ownership. There is significant evidence that shows that teachers are able to accurately measure and correctly identify children with vision impairment (Paudel et al. 2016; De Fendi et al. 2008; Khandekar et al. 2009; Ostadi Moghaddam et al. 2012; Sharma et al. 2008; Wedner et al. 2000).

Refraction

Who?

Children should be refracted by a recognised cadre within the health system (public/private), with the necessary competencies in refracting children.

How?

Objective refraction can be done by retinoscopy. An autorefractor validated for use in children can also be used, but this MUST be followed by subjective refraction.

Where?

Referral to optical centres which are not actively engaged in the program is not recommended as the quality of the refraction and the spectacles dispensed cannot be monitored and can result in over-prescribing and poor-quality spectacles being dispensed.

There are two alternatives:

1. Refraction takes place in the school or
2. Children who fail screening are referred to an eye care provider engaged in the program.

The advantage of school-based refraction is that a high proportion of children who fail screening can be refracted. The disadvantages of this vertical approach are the additional cost to the program

which limits sustainability, and lack of ownership of eye problems by the community. Another disadvantage is that cycloplegic retinoscopy is more problematic as parental consent is required.

The advantages of refraction in the eye care facility are the reduced costs to programs and hence greater sustainability, and ownership can be built. Among the disadvantages are that it is recognized that a high proportion of children referred for refraction do not attend, and costs of travel have to be borne by parents which may result in inequity.

Indications for cycloplegic refraction

Children should be referred for cycloplegic refraction if they are uncooperative or difficult to refract because of media opacities or irregular corneas, if there is a variable or inconsistent end point to refraction, in the presence of strabismus or suspected amblyopia. Parents' consent must be obtained prior to instillation of any eye drops.

In children over the age of 5 years, 2 drops of cyclopentolate 1% should be administered per eye with 5-10 minutes separation between instillations.

Guidelines for prescribing for children

The following indications for correction provide a way to objectively prioritize refractive care in situations of limited resources, but should not override individual needs where resources permit.

As most studies show that spectacle wear is associated with poorer uncorrected VA and higher levels of refractive error, the guidelines are primarily based on improvement in distance VA with correction, taking account of other related ophthalmic factors. All prescribing should be based on appropriate refractive technique (e.g. retinoscopy) undertaken by competent practitioners.

Note: The degree of improvement in VA should be tested uncorrected and with corrective lenses with both eyes open (binocularly).

Correction for myopia is indicated if:

- minus powered lenses improve the vision by 2 or more logMAR/Snellen VA lines

Correction for hypermetropia is indicated if:

- plus powered lenses improve vision by 2 or more logMAR/Snellen VA lines
- OR there is amblyopia and the child's age suggests the amblyopia is potentially treatable;
- OR there is esotropia or large esophoria and the child has some potential for normal binocular vision.

Correction of astigmatism is indicated if:

- cylindrical lenses improve vision by 2 or more logMAR/Snellen VA lines and/or noticeably improve eye comfort,
- OR there is amblyopia and the child's age suggests the amblyopia is potentially treatable.

Correction for anisometropia is indicated if:

- significant anisometropia i.e. ≥ 2D AND one or more of the following: correctly balanced lenses improve vision of the most affected eye by 2 or more logMAR/Snellen VA lines, and/or noticeably improve eye comfort,
- OR there is amblyopia and the child's age suggests the amblyopia is potentially treatable.

A note on prescribing for children with aphakia

Children with aphakia typically require high-powered plus lenses of 10 D and above. When prescribing for school-aged children a near addition of +2.50 to +3.00 D is recommended depending on the child's working distance.

Correction options for children include spectacles and contact lenses. The final choice depends on many factors including technical expertise, availability of suitable contact lenses, compliance, cost and social factors.
Spectacle lenses should be of aspheric design in a scratch resistant lightweight resin material to reduce thickness and weight and to improve cosmesis. Bifocal lenses are recommended for school-aged children. The spectacles may need to be replaced frequently as the lenses become scratched.

Contact lenses should be of high oxygen permeability. When considering this option, the child should be mature enough or their parents need to be capable of managing lens wear. A near addition is required, typically in the form of near, bifocal or progressive powered lenses.

Children with aphakia with low vision should to be referred for low vision services. Higher near additions (+8.00 D or more) may be necessary if the child also presents with low vision.

Indications for referral by the refractionist

Referral to the local eye care provider should be made if:

- Any child whose presenting visual acuity is less than 6/60 in either eye, even if due to a correctable RE;
- All children whose visual acuity does not improve to normal in both eyes with refraction
- The child requires cycloplegic refraction
- If a child has one or more of the following in one or both eyes:
    - the cornea is not transparent
    - the pupil is not round and black
    - one eye turns inwards or outwards (strabismus)
    - the eye(s) are red with discharge (conjunctivitis or allergy)
    - there is a white patch on the conjunctiva (Bitot's spot)

No child with low vision or who is blind should be referred directly to low vision services, special education or rehabilitation without first being assessed by an ophthalmologist.

Referral mechanisms

All children referred should be given an information sheet to take home to their parents.

Referral slips given to the child for their parents can be used together with a register at the hospital to track whether the child attended or not. Electronic mobile phone-based systems can also be used.

Referral to education and rehabilitation by an ophthalmologist

After a clinical diagnosis has been made and treatment given, if indicated, children with low vision should be assessed in a low vision clinic. Those who are blind, even after treatment if indicated, should be referred for assessment to the authorities providing rehabilitation services and special education.

Children with low vision

Children with low vision require a comprehensive low vision and functional visual assessment. Appropriate low vision and adaptive aids should be prescribed and modifications made to the environment to maximise learning (figure 23). Parents and teachers should be sensitised and support the child in the use of any prescribed low vision devices.

Figure 23. Child using a hand- held magnifier. *Photo courtesy of David de Wit*

Children with multiple disabilities

Prevalence of vision problems in children with multiple disabilities is high and this is often missed by both clinical education personnel. Special attention needs to be paid to children with multiple disabilities in school screening programs. Many children with multiple disabilities have poor accommodative facility and may require glasses for reading and near work

Detection and management of other common eye diseases in children (figure 24)

Common eye conditions of childhood include eye infections (conjunctivitis), lid infections (styes) and allergies (allergic conjunctivitis; vernal catarrh). These may keep children away from school or interfere with learning.

Other more serious eyes conditions which need to be detected and referred to an eye care provider for management include strabismus (in-turning or out-turning eyes), cataracts and amblyopia.

Some children have eye conditions which lead to visual loss and where no treatment is possible, including corneal scarring and diseases of the retina or optic nerve.

Recommended strategies

1. Train school nurses in the detection, management and appropriate referral of eye conditions in children, ideally by ensuring this is included in their curriculum;
2. Train teachers in simple eye examination using a torch to detect and refer children they suspect of having an eye condition
3. Optometrists / refractionists to detect and refer conditions as required during refraction.

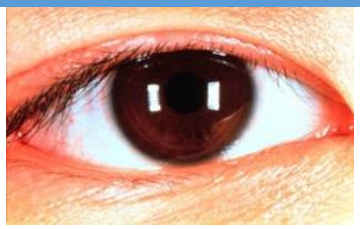
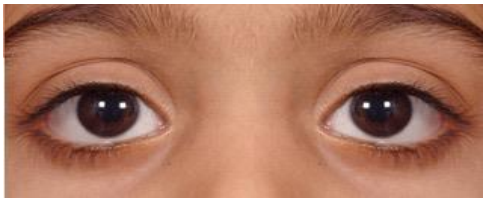
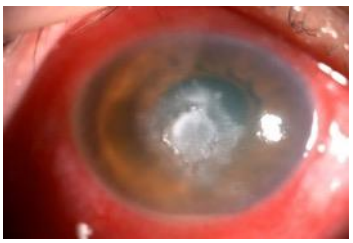
Signs of healthy eyes	Signs of unhealthy eyes
 The white of the eye should be white in colour *Photo courtesy of Brien Holden Vision Institute*	 A red eye with profuse discharge *Photo courtesy of International Centre for Eye Health*
 The eyes should be straight *Photo courtesy of Brien Holden Vision Institute*	 Outward turn of the left eye *Photo courtesy of LV Prasad Eye Institute*
 The corneal must be transparent and shiny *Photo courtesy of Brien Holden Vision Institute*	 Diseased cornea that is not transparent *Photo courtesy of LV Prasad Eye Institute*
 The pupils should be equal size, black, round and central *Photo courtesy of Brien Holden Vision Institute*	 White pupil *Photo courtesy of International Centre for Eye Health (photographer Volker Klaus)*

Figure 24. Comparison of healthy and unhealthy looking eyes

Teachers eye health

As the eye health of teachers is so important for quality education, teachers should be included in school initiatives. In order not to interfere with activities focusing on children, it is recommended that teachers are screened either before or after the children are screened.

Recommended activities – for vision

- All ages: Habitual distance visual acuity testing at the 6/9 level i.e., with distance correction if usually worn. If they fail in one or both eyes, refraction should be undertaken in the school, or they can be referred for refraction at a participating eye care facility
- Aged 40 years and above: Near visual acuity measurement to assess whether they can read N5 at 40 cm with current near correction or unaided. If not, a near add should be prescribed. Ready-made spectacles can be used for those without significant astigmatism or anisometropia (range +1.00 - +3.50 D).

Prescribing guidelines for teachers

The following indications for correction provide a way to objectively prioritize refractive care in situations of limited resources, but should not override individual needs where resources permit. The guidelines are primarily based on improvement in distance and or near visual acuity with correction, taking account of other related ophthalmic factors.

Correction for myopia is indicated if significant myopia is detected PLUS one or more of the following apply:

- difficulty with distance vision is reported
- minus powered lenses improve vision by 2 or more logMAR VA lines (or 2 or more Snellen VA lines) in one or both eyes.

Correction for hypermetropia is indicated if significant hypermetropia is detected PLUS one or more of the following apply

- difficulty with (far or near) vision or discomfort with concentrated visual effort is reported
- plus powered lenses improve vision by 2 or more logMAR VA lines (or 2 or more Snellen VA lines) in one or both eyes and/or noticeably improve comfort;

Correction of astigmatism is indicated if significant astigmatism is detected PLUS or one more of the following apply:

- difficulty with distance or near vision are reported
- cylindrical lenses improve vision by 2 or more logMAR VA lines (or 2 or more Snellen VA lines) in one or both eyes and/or noticeably improve comfort,

Correction for anisometropia is indicated if significant anisometropia is detected PLUS one or more of the following:

- difficulty with distance or near vision are reported
- correctly-balanced lenses improve vision of the worse eye by 2 or more logMAR VA lines (or 2 or more Snellen VA lines), and/or noticeably improve comfort,

Correction of presbyopia is indicated if plus lenses of 1.00D or more

- improve near visual acuity, or
- ease symptoms during near tasks

Recommended activities – other eye conditions

- Aged 40 years and above: Ask if the teacher has diabetes. If so refer to the eye care provider for retinal examination. Provide information about diabetic retinopathy
- Aged 40 years and above: If resources allow, perform undilated optic disc examination with referral of those with a cup:disc ratio of 0.8 or above in one or both eyes

Advocate with the Ministry of Education that all teachers aged 40 years and above have annual blood glucose and blood pressure measurement.

Control of other locally endemic eye conditions in children

Useful resource: The Healthy Eyes Activity Book:
http://www.sightandlife.org/fileadmin/data/Books/heab_new_e.pdf

Vitamin A deficiency disorders

Recommended strategies include:

- Nutrition education to include vitamin A rich sources of food and how to prepare and cook them;
- School garden to grow vitamin A rich foods
- Child-to-Child approach with messages that children can take home about breast feeding, vitamin A rich diet for young children, measles immunization, vitamin A supplementation of younger siblings, and to ask whether young children in the family have night blindness.

Trachoma

Recommended activities in schools relate principally to the F (facial cleanliness) and E (environmental improvement) components of the SAFE strategy for trachoma control:

- Provision of clean water for face washing, with provision of soap and towels (figure 25). In areas with poor water supplies a “leaky tin” or gourd with a hole in the bottom can be used.
- Provision of sanitation that is sensitive to the specific needs of adolescent girls
- Health education about personal hygiene and the risks of open defecation
- Hand and face hygiene checks at the start of the day
- Child-to-Child approach with messages that children can take home about face washing and avoiding open defecation

Figure 25. Children in Ghana give face washing demonstration
Photo courtesy of Sightsavers

Chapter 6 - Training

Roles and responsibilities of personnel involved in school eye health programs

Note: The following apply to the model where optometrists/refractionists visit schools to refract, and spectacles are delivered to each child in each school.

Program manager (PM)

Attributes

- Medically trained or trained in public health; program management experience. Preferably ophthalmologist or optometrist with management skills.

Responsibilities

Overall management of the program

- Planning all aspects of implementation
- Managing finances and other program staff
- Coordination and collaboration with partners, sensitization of other stakeholders
- Seeking permissions
- Trouble-shooting
- Procurement
- Leadership and motivation
- Managing data
- Communication
- Monitoring: ensure regular reporting; compilation; use indicators to identify problems
- Evaluation: initiation and planning
- Reporting to donors, Ministries and other stake holders
- Technical Program Manager will report to PM

Technical Program Manager

Attributes

- Skills in planning and management; communication and organization

Responsibilities

- Communication: liaison with teachers, obtains consent from parents
- Coordination: timetable for screening in collaboration with the school contact teacher/ head teacher through the liaison teacher
- Ensures an appropriate contact teacher is identified by the head teacher
- Contact point for contact teacher
- Relationship building with person respected by head teachers after intro by liaison teacher
- Organize a venue for screening: a large enough, well lit, clean room
- Communicate what screening will entail with head teachers etc. If child needs treatment what will happen
- Arrange dates for sensitization in school assembly

- Train and manage screeners
- Follow up children referred
- Answer technical questions from Contact Teachers i.e. face to face, by SMS or phone calls

Coordinator (could be a District level teacher)

Attributes

- Knowledge (authority/relationship) of all schools and teachers in the county
- Good relationship with senior education authorities

Responsibilities

- Works with program manager to seek permission and planning
- Coordinates training of screeners
- Visit every school
- Sensitize head teachers
- Appoint contact teachers
- Allocate schools for screening
- Day-to-day management of screeners
- Logistics
- Maintain record of number of children screened and referred

Local Education Authority

- Provides lists & locations of all schools in the area
- Gives permission for the programme to work in schools
- Local education authority school supervisors can help with the Monitoring of the teachers, to ensure school screening is taking place.
- Can be provided with statistics of schools & students' performance (prevalence of eye conditions, numbers of students accessing services.

Head teacher

- Identifies and supervises contact teacher
- Identifies teachers who could be trained as screeners
- Date for assembly sensitization
- Fix a date for screening

Contact teacher (one for each school)

Attributes:

- Knows and understand the family situation of the child i.e. financial, other issues
- Knows if there are any other children have eye problems
- Assists in identifying children to be given spectacles when they are delivered

Responsibilities

- At school level, prepares the venue
- Liaises with class teachers to ensure flow of children for screening
- List ready of children to be screened, gender, age, contact number for parent, which parent
- On the day helps screener
- Record of those screened and those referred
- Sends list of children referred to the referral centre

- Contact referral centre to identify children who have not attended
- Follow up those who have/have not gone for treatment

Class teacher

- Prepare list of children who require screening
- Contact teacher and Peek user assistance
- Names, phone numbers
- Assist the contact teacher with screening
- Crowd control on the screening day

Screener

- Liaise with contact teacher
- Check screening venue and measure and mark the screening distance
- Screen all listed children and record findings as per SOP
- Ensure children who fail screening are referred for refraction
- Prepare list of children who fail screening for contact teacher and refractionist
- Collects spectacles, delivers them to school and works with contact teacher to ensure the correct children are given the correct spectacles

Senior optometrist in partner eye hospital / department

- Maintains close communication with Technical Program Manager
- Allocates optometrists / refractionists to schools
- Ensures correct spectacles are made up correctly for all children requiring them

Optometrist / refractionist

- Refract according to SOP. Appendix 13 provides recommended guidelines for comprehensive eye examinations of children referred to eye care providers for school age children
- Prescribe according to SOP
- Record prescription
- Ask child to select preferred frames
- If vision does not improve with refraction record a preliminary diagnosis and refer according to SOP
- Give child needing spectacles or referral an information sheet for their parents
- Give contact teacher lists of children a) who fail screening and require spectacles b) those to be referred Give list of children who require spectacles to the relevant dispensing optician

Dispensing optometrist

- Makes up spectacles correctly, using the correct frame
- Marks each pair of spectacles with the child's name, class and school

Parents

- Take child to eye care provider, if referred
- Pay for treatment – mechanism required to support the child with financial barriers

Community opinion leaders

- Encourage children to be screened and to wear their spectacles
- Encourage parents to take child for treatment e.g. not spectacles

Child welfare officer

- Work with community leaders to encourage parents and children to comply with recommendations, if required.

Children

- Notify teachers or parents of poor vision
- Wear spectacles if prescribed
- Convey useful information about vision correction to peers, family, community
- Have regular eye exams

Table 4. Recommended duration of training of screeners and eye care professionals

Cadre	Training
Screeners (Health workers, teachers and nurses)	• Eye and vision screening for school aged children (5-18 years) • 5 hours • Incorporate a periodic refresher training program as well
Eye care personnel - Refraction (Optometrists, Ophthalmologists, Ophthalmic Clinical Officers (OCO), Ophthalmic Nurses (ON) and other cadres qualified to provide refraction services for children)	• Refraction and prescribing for children • 35 hours
Optical dispensers (Dispensing opticians, optometrists, OCO, ON and other cadres qualified to provide dispensing services)	• Dispensing for children • 3 hours
All cadres	• Child protection and gender equity • Documentation; monitoring • 4 hours

Periodic refresher training is vital to the long-term success of the school eye health initiative. It should be anticipated and planned for in each of the training programs as appropriate.

Training materials for optometrists and mid-level personnel may be accessed at:
http://www.brienholdenvision.org/education/download-resources.html

Chapter 7 – Child Protection

This chapter contains a summary of common child protection risks associated with School Eye Health Programs, as well as some practical ways to incorporate mitigation measures in the project planning. The overview is intended to stimulate thinking around possible child protection risks and how to mitigate them, and is not intended to be an exhaustive list (included with permission from The Fred Hollows Foundation).

RISKS AND MITIGATION

Education activities

Risks	Mitigation

• Child is abused, exploited or bullied by staff, consultants, volunteers or peers.
 	
• Teachers, children, parents and the community do not know how to or are too scared to report abuse or unsafe behaviours.
 	
• Wash facilities are not separated by gender or students and teachers.
	• Include child protection in the discussions /negotiations with education authorities /schools before the start of the project.
	• Consider the timing of the activity.
	• Ensure you are well informed about what is already in place and what the gaps are with regards to child protection, so these can be addressed or considered in the implementation:
	  ○ Ensure there are clear guidelines with regards to behaviour with children;
	  ○ Ensure there is a clear and functioning reporting and response mechanism in place to report child protection concerns and/or incidents;
	  ○ Ensure parents and children are aware and know how to use the reporting and response mechanism.
	
	• Provide safe, hygienic and inclusive child-only water and sanitation facilities, located close to classrooms, and separated by gender.
	• Ensure store rooms and staff toilets are located in such a way that they can be clearly seen.
	• Ensure: adequate lighting in buildings; no hidden spaces; adequate and safe boundaries (fencing); entry only through administration/reception; adequate shelter outdoors; designs that cater for those with a disability.
	• Water collecting points allow orderly collection of water at the tap stands.

Screening

Risks	Mitigation
• Child is abused, exploited or bullied by staff, consultants, or volunteers carrying out the screening. • Teachers, children, parents and the community do not know how to or are too scared to	• Ensure there are clear guidelines with regards to behaviour with children and all staff and volunteers engaged in the screening have been briefed on and have signed up to them. • Ensure children are well informed about the process of screening and what it entails. • Ensure the screening takes place in a visible area with at least two adults present.

report abuse or unsafe behaviours.	• Ensure there is a clear and functioning reporting and response mechanism in place to report child protection concerns and/or incidents. • Ensure parents and children are aware of the behaviour guidelines, and know how to use the reporting and response mechanism. • Consider the timing of the event – start early so activities are completed before evening.

If screening is carried out with staff/volunteers not usually present at the school, additional mitigation measures will have to be put in place, especially around the screening of additional staff and volunteers, and clear guidance for their behaviour. Staff should be screened during the interview process, reference checks must be carried out and they should produce relevant police clearance to confirm that they do not pose a risk to children. Staff working with children should agree in writing to abide by a code of conduct of working with children. An example is as attached in Appendix 12 (included with permission from BHVI).

Referral

Risks	Mitigation
• Child is abused, exploited or bullied by staff, carrying out further screening and/or treatment. • Provision of transport to and from referral make children vulnerable to abuse. • Referral facility exposes children to harm.	• Include child protection in negotiations and contracts with service providers. • Ensure there are clear guidelines with regards to behaviour with children and all staff in the project have been briefed on have signed up to these guidelines. • Encourage parents/caregivers to accompany their children to referral appointments. • In case of provision of transport, make sure driver(s) are aware of and committed to the guidelines for behaviour, children are never alone with the driver, and there are guidelines for safety in transport (there should be in an operations handbook).

Risks increase if referral and treatment are not subsidized, as parents, and children, can be asked to 'pay in kind' for the services received, creating a risk of abuse.

Treatment (including glasses)

Risks	Mitigation
• Child is discriminated against or bullied as a result of wearing glasses. • No policies about bullying are in place.	• Design activities to de-stigmatise wearing glasses. Include research in the design to facilitate good outcomes for those wearing glasses. • Work with children to develop a code of conduct for them that includes peer-to-peer behaviour, as well as adult-to-child and child-to-adult behaviour. Have children sign onto these. • Educate children on the school's code of conduct, especially regarding bullying.

Child protection should also be a consideration for inclusion in promotional materials. Children must always be portrayed in a respectful, appropriate and consensual way when photographing, filming or using images. No identifying information of the child should be used in the publication of images and parental consent must always be sought when using images.

More information on child protection can be accessed at the Brien Holden Vision Institute's Social Responsibility self-paced course which features gender equity, disability inclusiveness, child protection and environmental protection is available at: https://academy.brienholdenvision.org/browse/resources/courses/social-resp

Cultural and diversity considerations

Staff working on school eye health programs need to be aware of and sensitive to cultural diversity, as cultural and social norms can affect the program's likelihood of success.

With regards to eye health, culture can impact on people's perceptions of disease and what they are willing to communicate with health workers; health-seeking behaviour; understanding of the treatment process, options and decision making; interactions with program staff and health services; attitudes to outsiders, helpers and authorities; gender norms and differential treatment of boys and girls; and community attitudes (and potentially stigma) towards vision impairment, disability and wearing glasses.

We recommend that program managers engage with partners and relevant stakeholders at early stages of planning to discuss cultural considerations for the project, and be prepared to adapt the program as required.

Chapter 8 – Technology guidelines

The strengths, weaknesses and competencies for screening, refraction and dispensing are shown below (Table 5).

Table 5- Screening, Refraction and Dispensing.

	Screening	Refraction	Dispensing
Strengths	▪ Provides coverage to a large number of school children ▪ Can be undertaken in a relatively short period of time ▪ Is a cost-effective approach ▪ Can identify children with obvious vision impairment or overt eye problem with relative ease once trained in screening ▪ Create large scale awareness about eye health in children and among school staff and local communities ▪ Can be integrated in ongoing school health initiatives ▪ Non-health cadres like school teachers can be trained to screen children for vision impairment and eye problems	▪ Spectacles can be dispensed either on-site or through a distribution mechanism ▪ On the basis of screening programs, a regular and common inventory of spectacle powers can be developed that is easy and convenient to distribute on-site or through a distribution mechanism ▪ Provision of spectacles through a screening program provides financial relief to the parents – either through free provision or affordable cost which is less than the market price	▪ Dispensing of spectacles is linked to the refraction process – depending on local settings, dispensing can be incorporated in a screening program (e.g. provision of spectacles on-site or through a distribution mechanism) ▪ Optical dispensing facilities can be established as autonomous income-generating services that are either attached to district or tertiary eye units in hospitals, or as stand-alone services in the private sector ▪ After an initial investment to establish an optical dispensing facility, it can generate enough funds to become self-sustainable provided it has an income generating component to which it has unrestricted access
Limitations	▪ Screening programs require teams of trained persons – unless their costs are met from regular government sources, they present long-term sustainability challenges ▪ They require robust referral and feedback mechanisms that are responsive to increased workload caused by referrals from the screening process ▪ The referral facilities may be far and few between, which may present challenges for poor communities and those located at considerable distances	▪ Requires a supply chain distribution mechanism – if there is no cost recovery mechanism, or no government support to meet the costs of an optical workshop to meet operational costs, it can present challenges for long-term sustainability and continued supply of spectacles to school children ▪ A cost-effective range of spectacle frames is not always accepted or favoured by school children due to aesthetic reasons – the children may receive spectacles provided through a screening program, but may not actually wear them	▪ Involves the process from actual refraction of the individual, to prescription of the spectacles required, through to actual delivery and fitting of spectacles – if there is sub-optimal quality in any of one of the three critical steps in dispensing, it may result in an incorrect prescription and resultantly poor compliance of using the spectacles ▪ A school eye health screening program must ensure strict quality controls for each of these three steps

	▪ School eye health needs to be embedded within the school health curriculum for it to become a regular and ongoing activity in schools ▪ Screening for school eye health requires considerable and sustained engagement with both the education and health authorities – this requires good working knowledge of the education and health sectors and their respective structures ▪ A school eye health program is not a one-off activity – it needs to be repeated periodically to identify and treat the new pool of children with uncorrected refractive errors, especially those aged 10-15 years	▪ School eye health programs need to cater for multiple spectacle prescriptions over time for children owing to breakages, lost spectacles, and change of design ▪ Children with hypermetropia may require cycloplegic refraction. This involves instillation of cycloplegic eye drops before refraction. It also means that the child may need a subjective refraction at a later date before an adequate prescription can be provided	▪ Any optical dispensing service requires availability of spectacle frames and accessories, spectacle lenses, and optical equipment (e.g. automated edgers, pattern cutters, hand glazers and edgers, tools and instruments) – this requires initial investment and a cost recovery mechanism to ensure a rolling inventory of supplies and operational maintenance
Competency	▪ Requires the following human resources: ○ Someone who can conduct screening of school children for vision impairment and eye problems – e.g. school teacher; school nurse; primary health care physicians; community health nurses; early childhood development practitioners ▪ The members of the screening team must be trained in the screening techniques using a supporting curriculum and learning module developed for this purpose ▪ School eye health would need to be incorporated in the school health curriculum and in-service teacher training program – this would require curricular reform for it to be institutionalised ▪ Members of the screening team must be certified by an appropriate authority as being competent to screen children for vision impairment and eye problems ▪ Strict quality control must be ensured in the screening process ▪ Program guidelines and standards must be developed for screening in school eye health programs	▪ Requires the following human resources: ○ Someone who can perform an adequate refraction – e.g. an optometrist or ophthalmologist; Refractionist in some settings ▪ The service provider must not only be competent in refraction techniques, but have experience in refracting children as refraction in this age group is different from that in adults ▪ While most optometry and ophthalmology training programs provide good exposure to refraction, refractionists from refraction services must be adequately trained in refraction of children – this may require additional training ▪ A Refractionist or similar mid-level ophthalmic cadre must be certified by an appropriate authority as being competent to perform refraction in children ▪ Strict quality control must be ensured in the refraction process ▪ Program guidelines and standards must be developed for refraction in school eye health programs	▪ Requires the following human resources: ○ An adequately trained dispensing optician, or optical technician who is familiar and experienced in glazing of lenses and fitting of spectacles ▪ As cheaper options for automated optical glazing equipment emerge, opticians and optical technicians must be familiar with and trained in the use of automated glazing machines ▪ Strict quality control must be ensured in the dispensing process ▪ Program guidelines and standards must be developed for optical dispensing in school eye health programs

Equipment and spectacles

Technology should be used to support the expansion and improve the quality of refractive care, but only in the context of comprehensive eye care. Essential and appropriate technology that assists refractive care includes:

Locally-affordable instruments

- Retinoscopes, trial frames for adults and children and trial lenses are recommended from among the options that are available, based upon current information and experience with validity, reliability, cost and feasibility
- Alternatives such as low-cost auto-refractors may become available if their validity (particularly the control of accommodation in children) is proven and should be considered where appropriate

Locally-affordable and available topical medications

- Short-acting topical cycloplegic agents such as cyclopentolate hydrochloride - 1.0% is recommended

Affordable spectacles

- Purchasing, manufacture, distribution services, warehousing and inventory management for affordable spectacles should be accurate and efficient
- Custom-made spectacles, and conventional or “clip in and out” ready-made spectacles are recommended from among the options that are available, based upon current information and experience with validity, reliability, cost and feasibility
- Quality standards (as equivalent to ISO standards as practical) should be maintained for both custom-made, ready-made and clip in and out spectacles (See Appendix 14).
- Recycled or self-adjustable spectacles should not be used (See Appendix 14 and 15)

Eligibility for ready-made spectacles

The following children are not eligible for conventional ready-made spectacles (i.e., which have the same power in each eye):

- If there is astigmatism of >0.75D in one or both eyes, OR
- The spherical equivalent required in each eye is greater than +3.50D or -3.50D

Children should fulfil ALL the following criteria to be eligible for conventional ready-made spectacles

According to the prescription:

- The spherical equivalent improves the visual acuity equal to, or not more than one line less than full correction in the better eye AND;
- The difference between the spherical equivalent in each eye is not more than 1.00D;

According to the frame sizes available:

- The inter-pupillary distance matches that of the frames available (less than 0.5 prism dioptres of induced prism)
- The spectacle frames are acceptable to the child
- The spectacle frames are a comfortable fit

Tips for dispensing spectacles for children are shown in Appendix 14. For information on where to source eye health products and technologies the IAPB Standard List can be a useful source of information: https://iapb.standardlist.org/

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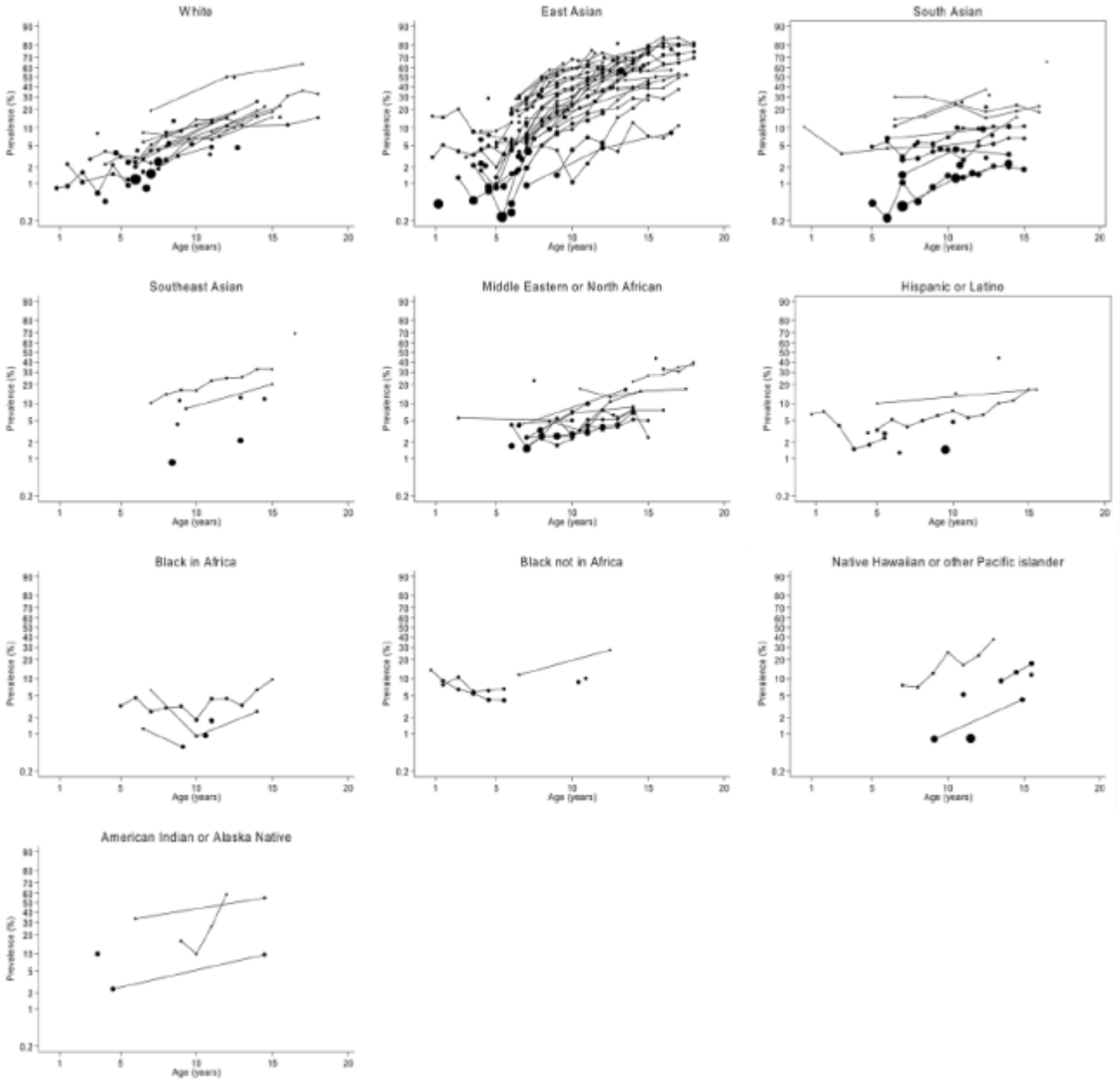
Appendices

Appendices

Appendix 1. Prevalence of myopia in children by age and region



From: Rudnicka, A.R. et al., 2016. Global variations and time trends in the prevalence of childhood myopia, a systematic review and quantitative meta-analysis: implications for aetiology and early prevention. Brit J Ophthalmol .doi.org/10.1136/bjophthalmol-2015-307724)

Appendix 2. Definition of technical terms

Refractive errors in children and adults

Refractive errors (RE) lead to an unfocussed image falling on the retina which causes blurred and/or distorted vision. Refractive errors, which are measured in dioptres (D), are the most common cause of vision impairment in children and adults and can be corrected by spectacles or contact lenses in the majority of cases. There are several different types of refractive errors, which cause different symptoms, and occur in all populations but to varying degrees (Table 1).

Table 1. Comparison of types of refractive errors, target groups, symptoms and correction

Technical term	Lay term	Groups affected	Impact on vision	Type of correction
Myopia	Short/Near sightedness	Children and adults	Clear near vision; blurred distance vision	Minus (-) spectacles or contact lenses
Hypermetropia / hyperopia	Long/Far sightedness	Children and adults	Clear distance vision, blurred or difficulty with near vision	Plus (+) spectacles or contact lenses
Astigmatism	-	Children and adults	Distorted vision at all distances	Cylinder (+ or -) spectacles or contact lenses
Anisometropia	-	Children and adults	Different vision impact in right and left eye	Different power spectacle lenses or contact lenses needed for each eye
Presbyopia	-	Adults aged 40 years and above	Difficulty seeing near objects clearly	Plus (+) spectacles

Definitions of significant RE*

Myopia adults	-0.50 Dioptre sphere (DS) or more for children, or -1.00DS or more for
Hypermetropia/hyperopia	+2.00DS or more at any age
Astigmatism	more than 0.75D cylinder
Anisometropia	difference of 1.00D or more between eyes
Presbyopia	inability to easily read N8 with distance correction, if required, which improves with plus lenses

*Note: These are the definitions used in surveys, and do not define refractive errors that need to be corrected. See sections in prescribing guidelines

Other more common eye conditions in children

Trachoma

Trachoma, an ocular infection caused by chlamydia trachomatis, is the most common cause of blindness due to an infectious disease. It principally affects the poorest communities. Signs of active infection are principally found in children less than 10 years of age while the scarring stages affect adults. Five recognized stages are used to map where trachoma is endemic. There are global initiatives for the control of vision loss due to trachoma involving multiple collaborators and partners, for example, VISION

2020: The Right to Sight initiative, International Trachoma Initiative, etc. The SAFE strategy is a program created to control trachoma: **S**urgery to correct upper eyelid deformities, usually in adults; **A**ntibiotics delivered to communities with active infection, including children; **F**acial hygiene, to reduce the risk of transmission of infection, and **E**nvironmental improvement, focusing on water supplies and sanitation, to reduce transmission. Trachoma coalition: http://www.trachomacoalition.org/

Vitamin A deficiency disorders

Vitamin A deficiency disorders (VADD) principally affect pregnant and lactating women, and preschool aged children who live in poor communities. A diet low in vitamin A rich foods, and malabsorption and diarrhoea due to poor water supplies and sanitation are the underlying causes. Children who are deficient may or may not have eye signs which are classified as night blindness, conjunctival and corneal drying (xerosis), corneal ulcers and corneal scarring. In children, VADD is associated with increased mortality and there are global initiatives for control, including vitamin A supplementation of pre-school age children and addressing the underlying causes. http://www.who.int/nutrition/topics/vad/en/

Amblyopia (lazy eye)

Amblyopia is another reason why detecting and treating eye problems in childhood is so important - if the amblyopia is detected later in life, it is often too late to improve vision.

At birth an infant's visual system is not fully developed. Over the next few months and years, as the eyes grow, connections between the eye and brain mature, and changes take place in the brain. If a clear, focused image does not fall on the retina, the changes in the brain do not take place and normal vision does not develop. This is called amblyopia, or "lazy eye". The vision in one eye only is usually affected, but both eyes can be affected if, for example, the child has bilateral cataracts of early onset, or there is a pronounced refractive error in both eyes.

Amblyopia affects approximately 1-3% of children aged 4 years and above (Solebo AL, 2015). Approximately half of amblyopia in one eye is due anisometropia (different refractive error in each eye), a quarter is due to strabismus (see below) and in the remainder there is a combination of strabismus and refractive error.

Detecting amblyopia

In children older than 8 years, amblyopia can be detected by standard vision screening of each eye, followed by refraction. If there is no squint, and the vision does not improve with refraction, and no eye problems are detected, amblyopia may be the cause.

In children less than 8 years of age, vision screening using the HOTV chart should be used as this is more likely to detect amblyopia (Figure 1).

Figure 1. HOVT chart for younger children

However, confirmation of amblyopia can only be made after a full ophthalmic examination to rule out other causes of poor vision.

Treating amblyopia

If amblyopia due to uncorrected refractive error is detected early, before the age of 7 or 8 years, the vision can be improved in the lazy eye, by intermittent occlusion (patching) of the good eye, which stimulates the part of the brain receiving visual information from the lazy eye (Figure 2) (Solebo AL, 2015). Amblyopia in older children can be treated but with slightly poorer outcomes (Chen AM, 2016).

Figure 2. Occlusion of the left eye and spectacle correction to treat amblyopia in the right eye
http://optometrist.com.au/amblyopia-lazy-eye/

All children who fail vision screening in one or both eyes where refraction does not improve to normal in both eyes should be referred for a comprehensive eye examination including pupil dilation.

Strabismus (squint)

Strabismus refers to misalignment of the eyes, and one eye only is usually affected. The eye can be deviated inwards (esotropia, Figure 3) or outwards (exotropia, Figure 4) or upwards (hypertropia) or downwards (hypotropia).

Right eye turning in (esotropia) Courtesy: Community Eye Health Journal

Figure 3. Inward deviation of the eye (esotropia)

Right eye turning out (exotropia) Courtesy: Community Eye Health Journal

Figure 4. Outward deviation of the eye (exotropia)

Strabismus may be present from birth (congenital esotropia), or it may develop in early childhood. In childhood the strabismus may be due to poor vision in one eye, from uncorrected refractive error or eye conditions such as cataract or retinoblastoma (a malignant tumour). Strabismus can also occur due to problems with the muscles which move the eyes.

All children with strabismus must be referred for detailed ocular examination to rule out serious underlying causes. Some children may require surgery to realign their eyes, which can also improve their appearance.

Cataracts

Cataracts are opacities in the lens of the eye. In children, cataracts can be congenital (i.e. present since birth), or may develop during early childhood (developmental cataract) or be acquired – from trauma or disease. Cataracts can be treated surgically, but this requires more expertise than cataract surgery in adults. If surgery is delayed in young children the visual outcomes are not as good due to the development of amblyopia.

Ptosis

Ptosis, or drooping of the upper eyelids in children, can have several causes and can affect one or both eyes. If the eyelid covers the pupil(s) it can lead to amblyopia. Children with ptosis should be referred for thorough investigation to rule out sinister causes and for treatment.

Eye conditions in adults

Presbyopia

The ability of the eyes to focus on near objects declines with age, a condition known as presbyopia. In presbyopia reading and other near tasks become increasingly difficult, particularly under conditions of poor lighting. Presbyopia increases with increasing age, so that by the age of 50 years, 50% of people need spectacles to read or see near objects clearly which increases to 80% or more by the age of 60 years.

Diabetic retinopathy

Diabetes, which is a condition of faulty metabolism of glucose, is increasing in frequency in most populations as a result of socio-economic development and changing life styles. Complications of diabetes include blindness from diabetic retinopathy, kidney failure, foot ulcers and an increased risk of strokes and heart disease, all of which can be reduced by good control of blood glucose and blood pressure. Up to 10% of people with diabetes develop “sight threatening diabetic retinopathy” (ST-DR) which is the result of damage to retinal blood vessels which become blocked or leaky. Early detection and treatment of ST-DR can be highly effective at preserving sight. http://www.idf.org/

Glaucoma

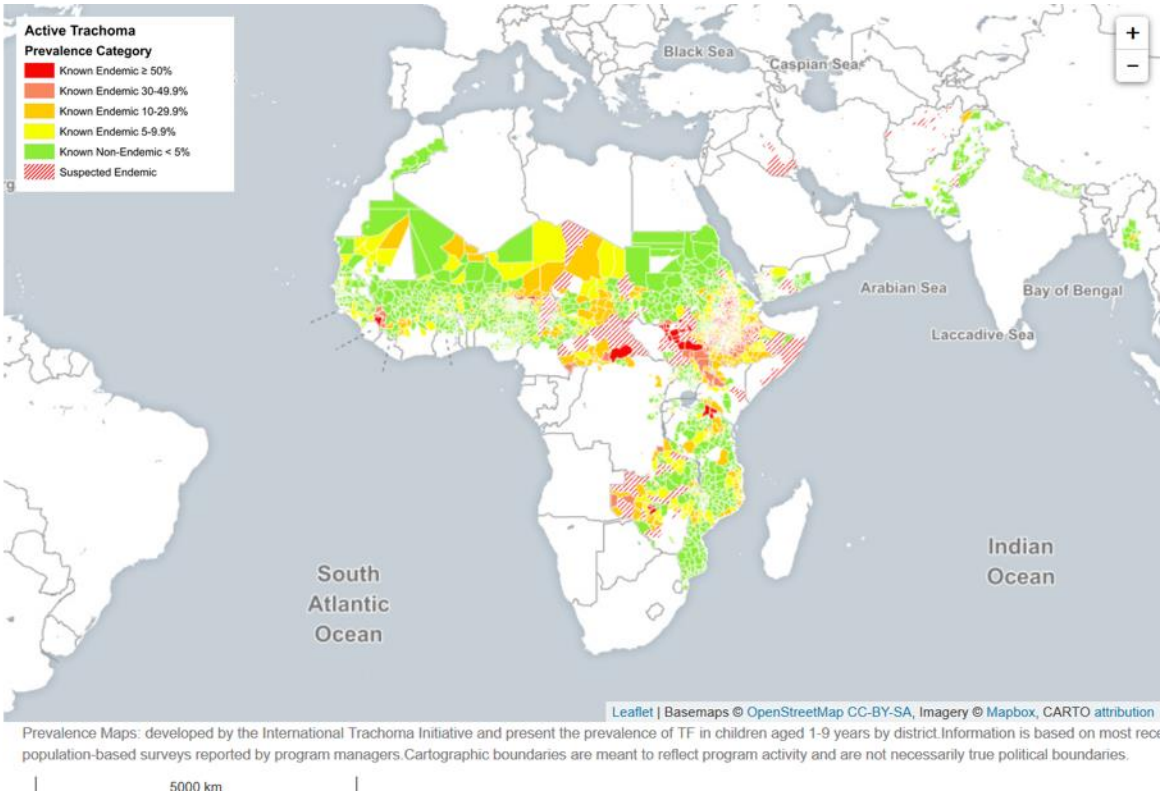
Glaucoma is a chronic eye condition which affects 3-5% of adults aged 40 years and above. In glaucoma the optic nerves are progressively damaged. Glaucoma, which causes no symptoms in the early stages, can lead to total, irreversible visual loss. Early detection and treatment to lower the pressure inside the eye can prevent blindness. (Figure 5)

Figure 5 How someone’s face may appear to someone with advanced glaucoma
Photo courtesy International Centre for Eye Health

Cataract

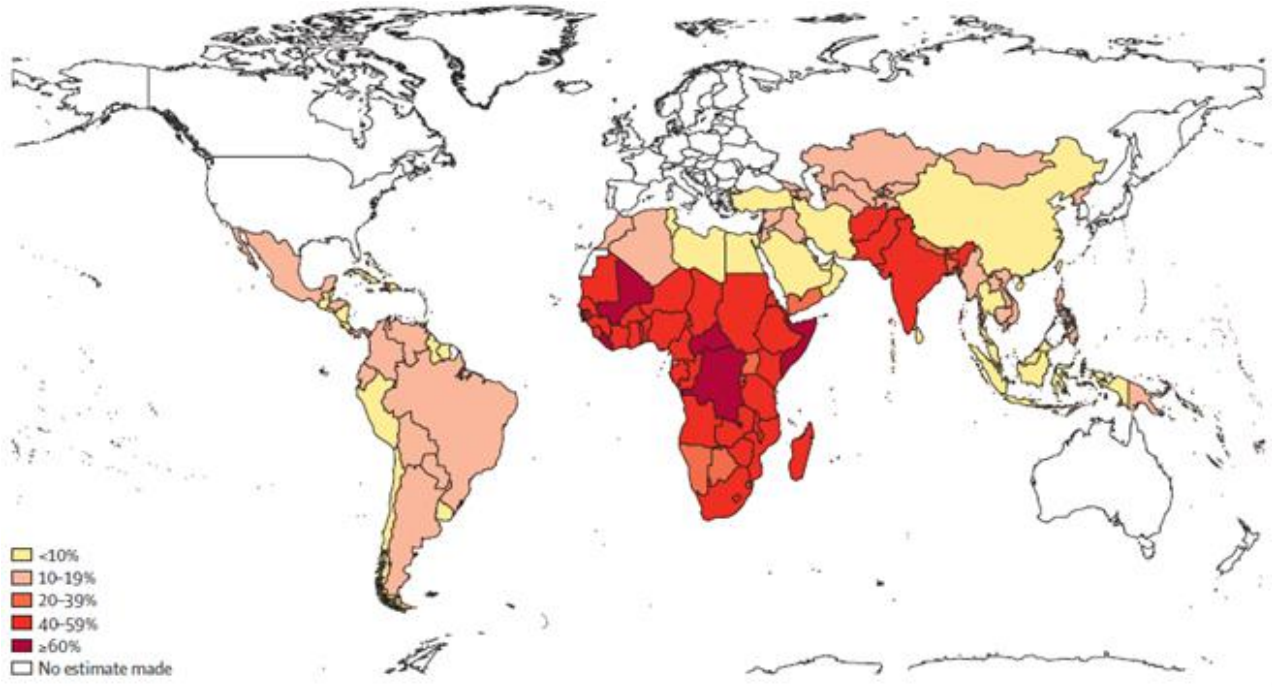
In adults, cataracts are typically present in older age groups (over 50-60 years) but can sometimes develop earlier. Diseases such as diabetes and chronic use of certain medications such as steroids can cause early onset of cataracts. Sight can be restored in the majority of cases by cataract surgery.

Appendix 3. Map of active trachoma



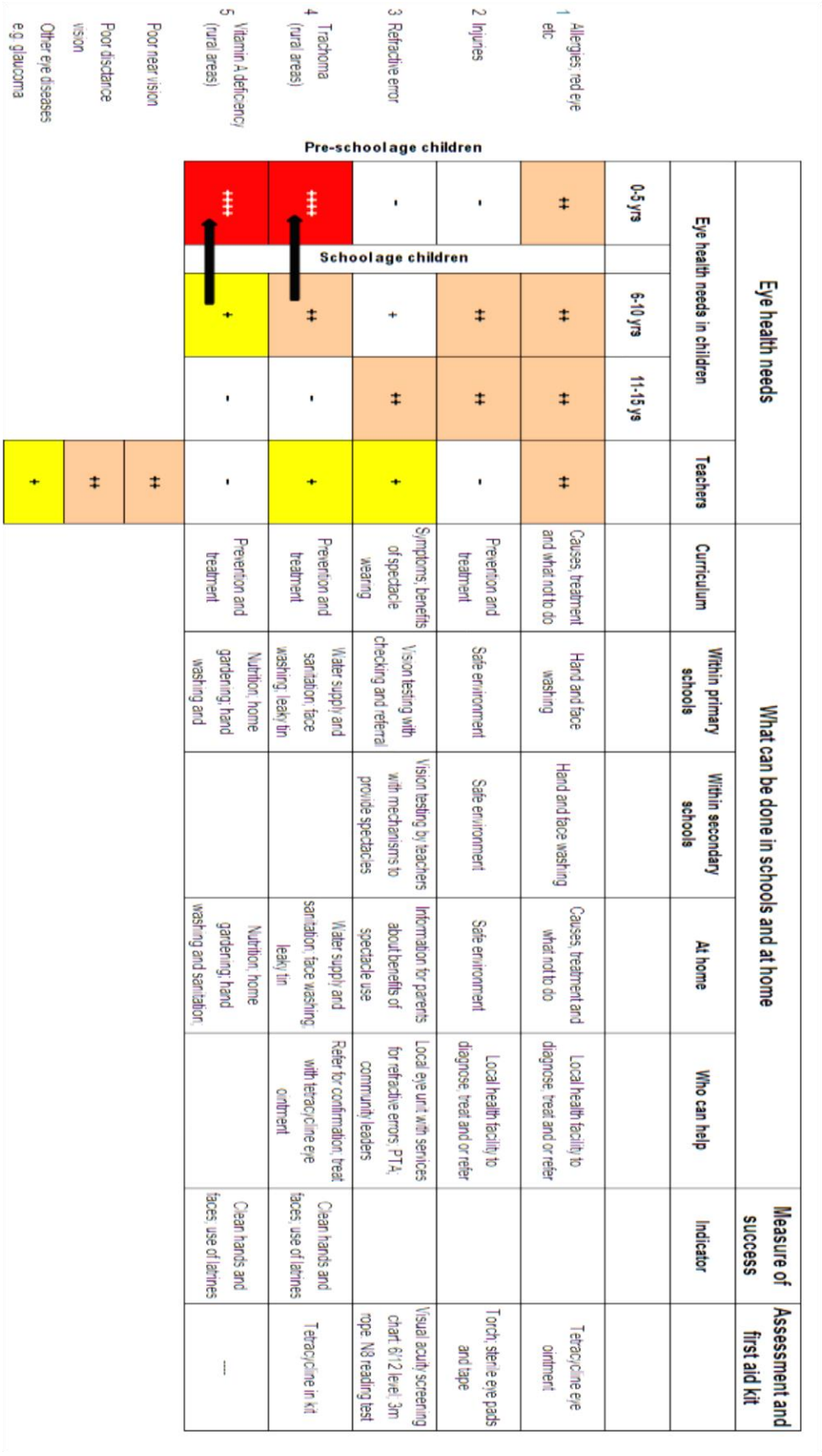
Source: Trachoma Atlas; available at: http://www.trachomaatlas.org/. Accessed January 2018

Appendix 4. Global prevalence of vitamin a deficiency in children aged 0-72 months, 2015



From: Stevens GA, Bennett JE, Hennocq Q, Lu Y, De-Regil LM, Rogers L, et al.
Trends and mortality effects of vitamin A deficiency in children in 138 low-income and middle-income countries between 1991 and 2013: a pooled analysis of population-based surveys. Lancet Glob Health. 2015 Sep; 3(9):e528-36.

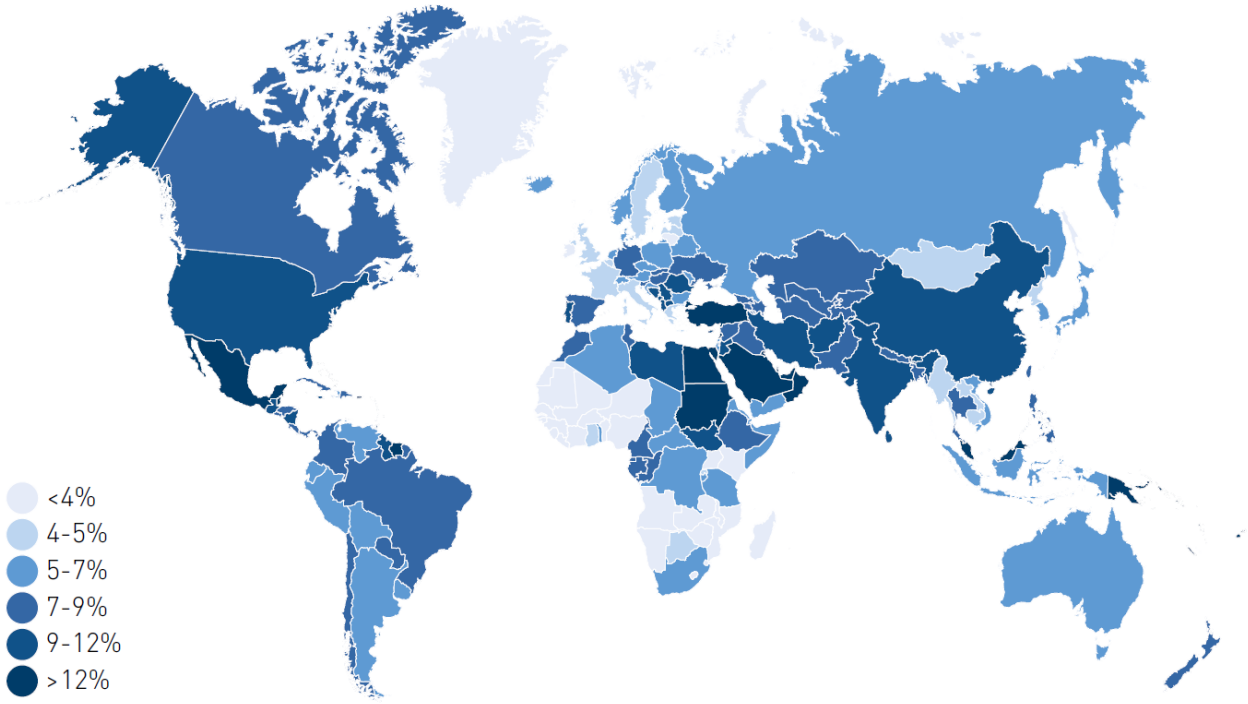
Appendix 5. Overview of the components of an integrated comprehensive school eye health program



Eye health needs					What can be done in schools and at home					Measure of success	Assessment and first aid kit
	Eye health needs in children										
	0-5 yrs	6-10 yrs	11-15 yrs	Teachers	Curriculum	Within primary schools	Within secondary schools	At home	Who can help	Indicator	
	Pre-school age children										
1 Allergies, red eye etc	++	++	++	++	Causes, treatment and what not to do	Hand and face washing	Hand and face washing	Causes, treatment and what not to do	Local health facility to diagnose, treat and or refer		
2 Injuries	-	++	++	-	Prevention and treatment	Safe environment	Safe environment	Safe environment	Local health facility to diagnose, treat and or refer		Tetracycline eye ointment
3 Refractive error	-	+	++	+	Symptoms, benefits of spectacle wearing	Vision testing with checking and referral	Vision testing by teachers with mechanisms to provide spectacles	Information for parents about benefits of spectacle use	Local eye unit with services for refractive errors, PTA, community leaders		
4 Trachoma (rural areas)	+++	++	-	+	Prevention and treatment	Water supply and sanitation, face washing, leaky tin		Water supply and sanitation, face washing, leaky tin	Refer for confirmation, treat with tetracycline eye ointment	Clean hands and faces, use of latrines	Torch, sterile eye pads and tape
5 Vitamin A deficiency (rural areas)	+++	+	-	-	Prevention and treatment	Nutrition, home gardening, hand washing and		Nutrition, home gardening, hand washing and sanitation		Clean hands and faces, use of latrines	Visual acuity screening chart 6\12 level, 3m rope N8 reading test
Poor near vision				++							
Poor distance vision				++							Tetracycline in kit
Other eye diseases e.g. glaucoma				+							---

Source: IAPB briefing paper, Advocacy for School Eye Health

Appendix 6. Map of the estimated age adjusted prevalence of diabetes in adults (20-79 years), 2017.



Source: International Federation of Diabetes Atlas; available at: http://www.diabetesatlas.org/

Appendix 7. Detailed situation analysis and data collection tools

Current school eye health activities

Do you have an existing school eye health-screening program? Yes / No

If yes:

Types of schools included e.g., government / private / informal / mix	
Funding source	
Who coordinates/manages the program	
Age range of children being screened	
Number of children screened annually	
Who currently performs the screening	
Number of screeners	
Number of children refracted	
Number of children dispensed spectacles	
Number referred for other causes (non-refractive error)	
Who provides the spectacles	
Proportion of children requiring spectacles receive them	
Proportion of children receiving spectacles who wear them	
Number of years the program has been running	
Frequency at which schools are revisited	

Situation Analysis for new / expanded school eye health programs

Overview

Planning for school health requires several stages which are summarized below

- Determine coverage of planned program area
- Assess whether there are policies for school health in the government health and education systems;
- Identify activities / programs for eye care in school children which are already being provided and who is managing them;
- Identify the unmet need for school eye health in the geographical area to be covered i.e. for refractive errors and other eye conditions
- Assess the resources and services available for eye care in children;
- Estimate the number of children to be screened and the number needing spectacles, referral and other interventions
- Estimate the number of teachers to be screened and who require eye care services

Program area

<u>Preliminary background information</u>

Country/ Region	
Total Population	

	%	Number
Population aged 0-5 years		
Population aged 5-10 years		
Population aged 11-18 years		

Planned program area

Geographical area to be covered:

State / province .....

District(s) .....

Total population in geographical area .....

Estimate of children aged 5-10 years .....

Estimate of children aged 11-18 years .....

Government policies in planned program area

Education policies for eye health	Yes	No	Comments
Eyes and vision included in school curriculum			
Health care provided in schools by nurse/trained teacher			
Eye Health policies			
Government policy for correction of RE in children			
If yes, is there financial support and what are the criteria?			
Financing mechanisms (e.g., insurance schemes) includes other eye conditions in children			
Other health policies			
Are other health conditions included in school health			
If yes, are there active school screening programs?			

Coverage of planned program

Type(s) of schools to be included

	Yes	No
Government		
Private		
Informal (e.g., faith-based)		
Other		

Obtain list of schools and estimate of number of children to be included

Provider	**Type of school (age group)**	**In geographical area**		**To be included in the program**	
		Number of schools	**Average enrolment**	**Number of schools**	**Target to be screened**
Government	Primary only (5-10)				
	Middle only (10-13)				
	Secondary only (11-18)				
	All ages (5-18)				
Private	Primary only				
	Middle only				
	Secondary only				
	All ages				
Informal	Primary only				
	Middle only				
	Secondary only				
	All ages				
Other					
Total to be screened					
	Aged 5-10 years				[a]
	Aged 11-18 years				[a]

[a] *See below*

Programs for eye care in school children already being provided

Are other organizations already providing school eye health in the planned program area?
Yes / No / not known

If yes, existing programs supported by other organizations

1. List organizations supporting school eye health in the proposed program area
2. Identify which schools they work in and which schools they plan to work in

Assess need for school eye health – refractive errors

Uncorrected refractive errors		Estimate
Children aged 5-10 years:		
Number of children to be screened[a]		
Estimated prevalence of uRE	%	
Estimate of number requiring refraction*		
Estimate of number requiring spectacles		
Children aged 11-18 years:		
Number of children to be screened[a]		
Estimated prevalence of uncorrected uRE	%	
Estimate of number requiring refraction*	*	*
Estimate of number requiring spectacles		

[a]*Use data from the table above*

**Assume 40-50% of children who fail vision screening will not require spectacles or referral for other eye condition, so this number will be almost double the number requiring spectacles*

Assess need for school eye health – other eye conditions

Is trachoma known to be endemic in the proposed program area? Yes / No

Is vitamin A deficiency known to be endemic in the proposed program area? Yes / No

Other eye conditions	Estimate
Children aged 5-10 years:	
Number of children to be screened	
Estimated prevalence with other eye conditions (approx 10-15%)*	
Number to be referred	
Children aged 11-18 years:	
Number of children to be screened	
Estimated prevalence with other eye conditions (approx 5-10%)**	
Number to be referred	

**referral for cycloplegic refraction and other eye conditions*
***referral for other eye conditions*

How might out-of-school be reached? (Vision Champions and case studies)

Resources available for eye care in children – service providers to be included

Lead referral / management eye care centre

Name and location _____

Identify other service providers who will be included in the program, bearing in mind the need, population density, distances etc.

Other eye centres being included and the services they will provide

Name of facility	Government / NGO / private	Town / city	Services: screeners; refraction; dispensing; primary eye care; surgery; low vision care; other
1.			
2.			
etc			

Resources available for eye care in children – Human Resources

Human resources available

- In main referral centre

	Total
Number of ophthalmologists	
Number of optometrists	
Number of mid-level ophthalmic personnel who can refract children	
Number of mid-level ophthalmic personnel with adequate competencies to asses children with eye conditions	
Number of low vision experts with adequate competencies to asses children	
Number of dispensing opticians will adequate competencies to asses children	

Human resources available

- In other eye centres

Eye care provider_____	Total
Number of ophthalmologists	
Number of optometrists	
Number of mid-level ophthalmic personnel who can refract children	
Number of mid-level ophthalmic personnel with adequate competencies to asses children with eye conditions	
Number of low vision experts with adequate competencies to asses children	
Number of dispensing opticians will adequate competencies to asses children	

Human resources – total available to be included in the program

Ophthalmologists .....
Optometrists .....
Mid-level ophthalmic personnel .....
Refractionists .....
Dispensing opticians .....
Low vision workers .....
Other, specify ....

Management and other key personnel

List the names of people responsible for the following roles:

Role	Number required	Named person (if known)	Contact details (if known)
Program manager	1		
Program administrator	1		
Technical lead	1		
Teacher liaison	1		
Contact teachers	1 per school		
Trainer of vision screeners	Add		

Equipment available to manage RE - *In main referral centre*

Equipment	Yes	No	Comment (including condition and number of pieces of each)
For refraction			
Visual acuity charts - distance			
Visual acuity charts – near			
Lea symbols chart			
Occluder			
Autorefractor			**Nice to have**
Retinoscope			
Paediatric trial frame			
Trial lens set			
Cross cylinders (±0.25 D, ±0.50 D)			
Flipper lenses (±0.25 D, ±0.50 D)			**Not needed, nice to have**
Duochrome test			**Can do without**
Cyclopegic drops			
Ophthalmoscope			
Fixation target			
For dispensing			
Lens edging and fitting equipment			
PD ruler / pupilometer			
Focimeter			
Frame heater			
Spectacle frames for children			
Other			
Low Vision Devices			

Equipment available to manage RE - In other eye centres, the table above can also be used

Provision of services for children

List the names of individuals who are responsible for providing services for children in the proposed program area.

Services for children	Individual(s) (name(s))	Eye care provider(s)(name(s))
Refraction		
Dispensing		
Low vision care		
Surgery and medical treatment		

Cost of providing services for children

Average cost	Government clinics /hospital	NGO clinics /hospital	Private services
Eye drops			
Refraction			
Spectacles			
Cataract surgery			
Squint surgery			

Estimating the work load for screening, refraction and dispensing in Years 1, 2 and 3

In year 1 it is recommended at all children aged 5-18 years are screened in ALL settings.

	Number to be screened (from table above)	Number to be refracted	Number to be dispensed spectacles	Number to be examined by eye care provider
Aged 5 -10 years				
Aged 11-18 years				
Total				

Important question:
Are there adequate resources available for each component?
If not, the target number of children to be screened needs to be reduced.

In year 2

- Primary school children: it is recommended at all children entering primary school are screened, and that all children given spectacles the previous year re-examined and re-issued spectacles, if required.
- Secondary school children: all children given spectacles the previous year re-examined and re-issued spectacles, if required.

In year 3

- Primary school children: it is recommended at all children entering primary school are screened, and that all children given spectacles are re-examined
- Secondary school children: screen all children, including those given spectacles

Assessing barriers and assumption

What are the key barriers (i.e. anticipated problems) which might have a negative impact on program implementation? *Example: girls do not like wearing spectacles*

How might these be addressed?

What assumptions (i.e. un-anticipated problems) have been made hinder implementation?
Example: trained staff, such as optometrists, will remain in post

How might the program continue if these are realized?

Appendix 8. Basic equipment list for screening and refraction

Teacher's screening

- Vision screener for three meters (6/9 optotype)
- Three-meter rope
- Record forms
- Torch

Optometrist (for refraction)

- Visual acuity charts - distance
- Visual acuity charts – near
- Lea symbols chart
- Occluder
- Autorefractor (Nice to have)
- Retinoscope
- Paediatric trial frame
- Trial lens set
- Cross cylinders (±0.25 D, ±0.50 D)
- Flipper lenses (±0.25 D, ±0.50 D) (Not needed, nice to have)
- Duochrome test (Can do without)
- Cycloplegic drops
- Ophthalmoscope
- Fixation target

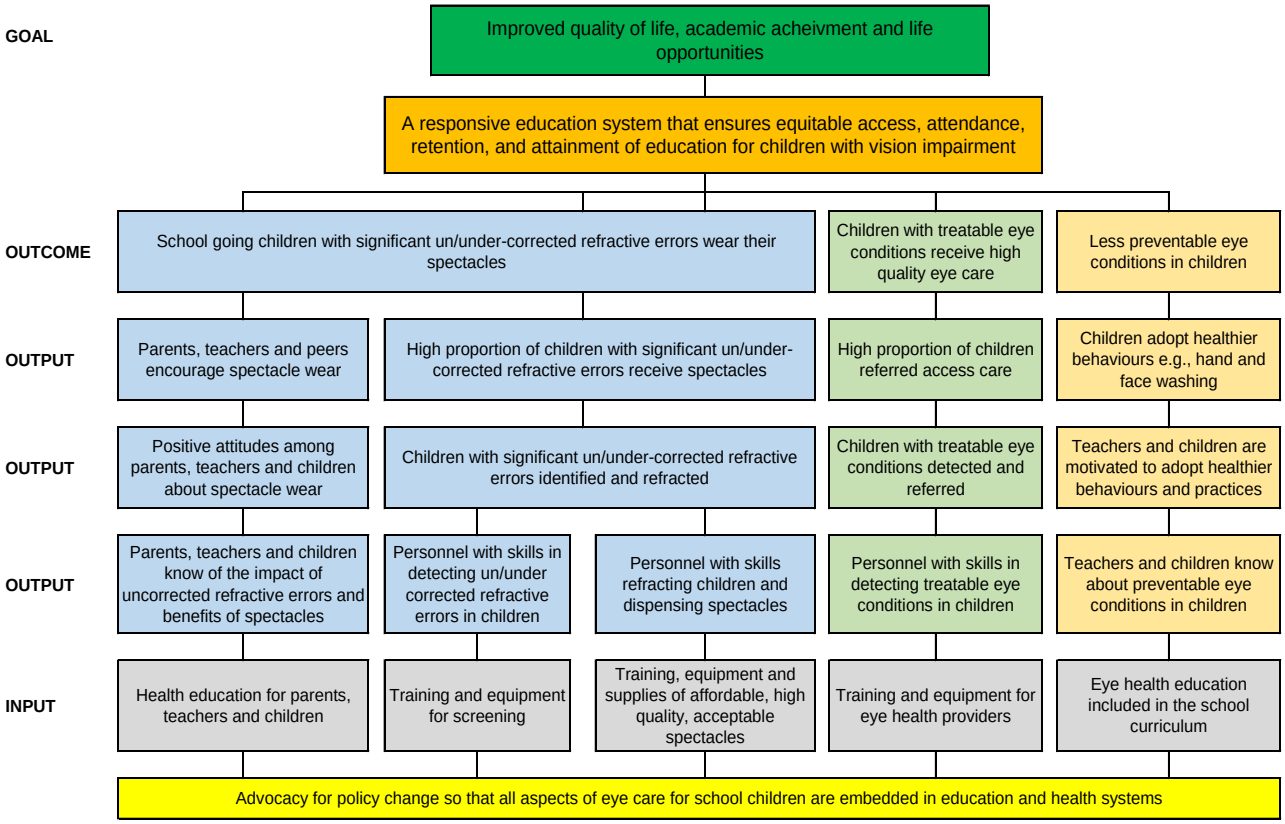
For Dispensing

- PD ruler / pupilometer
- Focimeter
- Frame heater
- Spectacle frames for children

Other

- Low Vision Devices

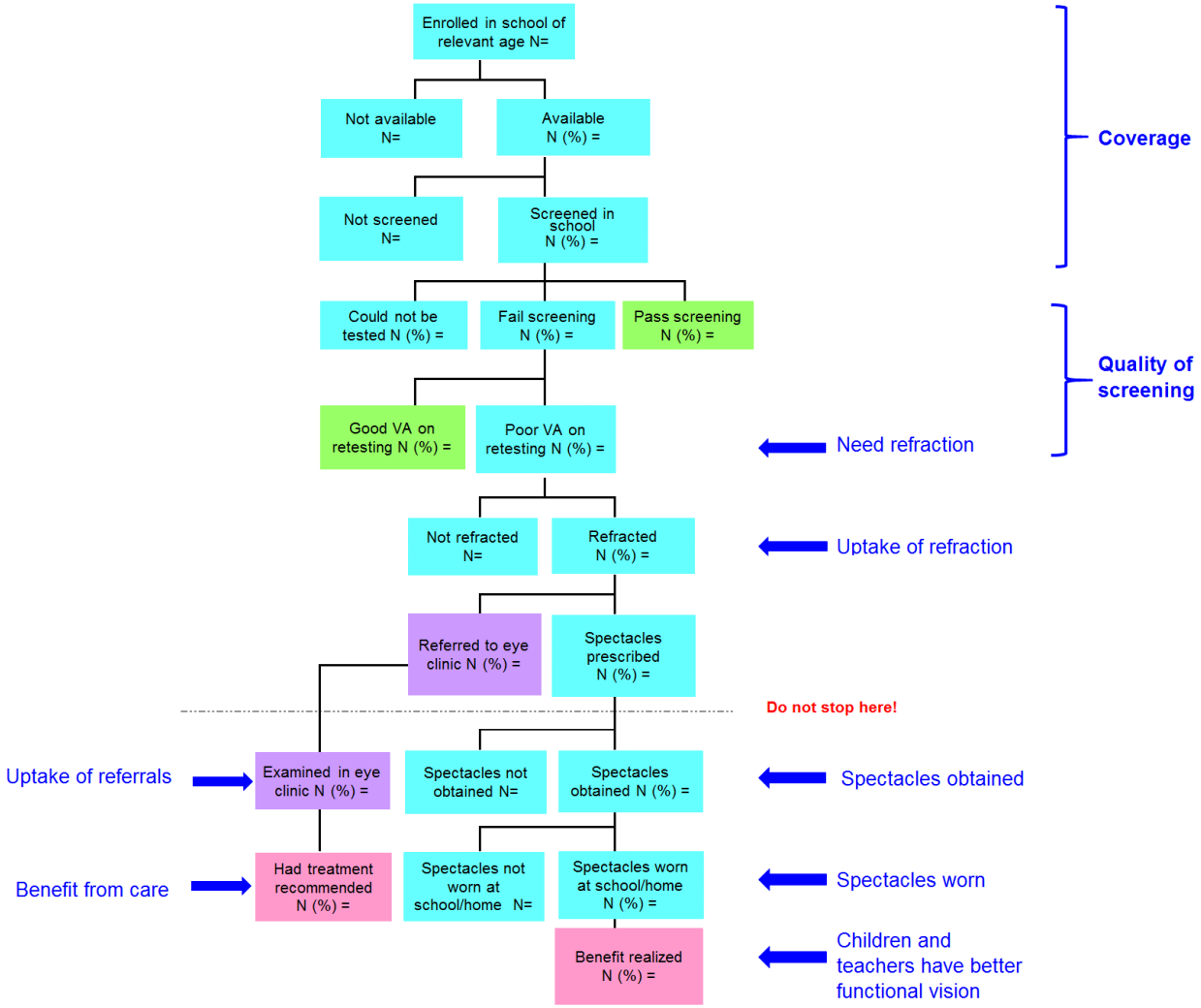
Appendix 9. Theory of change for school eye health programs



Appendix 10-A. Monitoring – Recommended indicators disaggregated by gender

Output indicators (number)	Male	Female	Total
Screeners trained			
Refractionists orientated			
Children screened 5-10yrs			
Children screened 11-18yrs			
Children refracted 5-10yrs			
Children refracted 11-18yrs			
Spectacles dispensed 5-10yrs			
Spectacles dispensed 11-18yrs			
Children referred 5-10yrs			
Children referred 11-18yrs			
Teachers screened			
Teachers dispensed spectacles (near and/or distance)			
Teachers referred			
Children exposed to health education			
Parents of children dispensed spectacles exposed to health education			
Parents of children referred exposed to health education			
Outcome indicators (%)			
Proportion of children enrolled in schools who are screened			
Proportion of children 5-10yrs requiring spectacles who receive them			
Proportion of children 11-18yrs requiring spectacles who receive them			
Proportion of children 5-10yrs receiving spectacles who wear them			
Proportion of children 11-18yrs receiving spectacles who wear them			
Proportion of children 5-10yrs referred who access eye care services			
Proporti Source: International Centre for Strategic Philanthropy			
Proporti			
Proportion of teachers referred who access eye care services			
Impact			
Number of children undergoing sight restoring surgery			
Change in quality of life / visual functioning in children wearing spectacles			
Program indicators			
Number of prescriptions of different powers (i.e., number more than -5.0D; number -5.0D to -2.10D; number -2.00 to -0.5D etc) dispensed			
Number of spectacle frames of different sizes dispensed			
Number of spectacle frames of different types dispensed			

Appendix 10-B. Flow diagram for monitoring school eye health programs



Effectiveness = Number wearing spectacles / number prescribed spectacles x 100 (%)

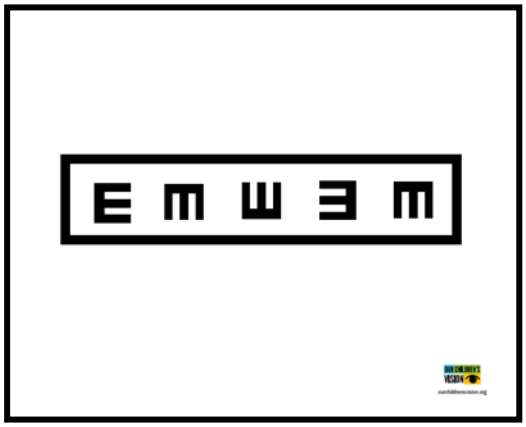
Appendix 11. Example of clinical vision screening protocol: Guidelines for Teachers

THE EYE AND VISION SCREENING PROTOCOL

The purpose of the vision screening protocol is to identify the persons in need of refractive, clinical or hospital-based services and to refer accordingly.

DISTANCE VISION SCREENING

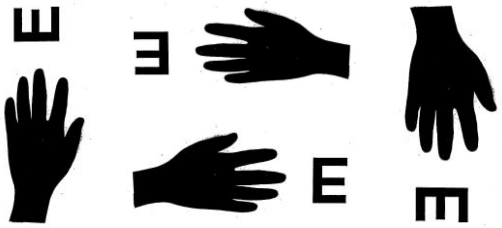
- The vision screener has a single line of symbols (6/9) for vision screening.
- The child is able to see the target if she or he correctly indicates the direction in which the legs of the symbol are pointing
- Inability to identify the symbols correctly indicates that the child's vision is below normal and he or she needs to be further examined and treated at a facility with an eye clinic with a suitable eye care practitioner, such as an ophthalmic clinical officer or an optometrist or an ophthalmologist, and the necessary equipment and infrastructure.



The Vision Screener

Procedure:

- Take the vision screener close to the child and explain that you will point at the 5 Es and s/he should point at the direction of the "legs" of the E.
- If the child normally wears eye glasses to see in the distance, tell her/him to wear them during the test.
- Ask the child to stand 3 meters from the chart (measure the distance using the tape or rope provided).
- Ask the child to cover their left eye with the occluder, or with the palm of their hand (NOT their fingers as they may peep between them). Tell the child not to press on the eye being covered.
- Test the right eye first. Stand behind the vision screener and point at the row with small symbols. Record the findings in the record form (see the section below on Pass/Fail criteria and Record Form attached).
- Then ask the child to cover the right eye to test the left eye. Record the findings in the Record Form.



Child's responses observed when using the Vision Screene

Photo courtesy Brien Holden Vision Institute

PASS

- The test is passed if the child correctly indicates the direction of at least 4 of the 5 symbols with each eye.
- Record this in the Distance Visual Acuity (Distance VA) column as PASS.

FAIL

- A FAIL is recorded if the child can only see 3 or less Es in EITHER eye.

Example

A child correctly identifies: R 4 out of 5 Es L 2 out of 5 Es

Distance VA: Right eye	Distance VA: Left eye	Eye health exam Right eye		Eye health exam Left eye		Referral
PASS/ FAIL	PASS/ FAIL	PASS	FAIL	PASS	FAIL	Yes / No
Pass	Fail					Yes

For eye care practitioners conducting screening

- If the child is able to correctly identify at least 4 out of the 5 symbols, place a +2.00 lens over the eye and repeat the vision measurement.
- If the child is still able to correctly identify ANY of the 5 symbols, he/she has FAILED the vision screening, as this result indicates hyperopia. This child should be referred.
- Record as with +2.00 and FAIL.

What to do when a problem is detected when conducting the vision screening

- Children who fail the vision screening must be referred to an eye department for a comprehensive eye examination or at temporary facility set up at the school.

SCREENING THE HEALTH OF THE OUTSIDE OF THE EYE

- Always wash your hands before touching the child's face or eyelids
- Use a torch or pen light to see more clearly
- Always inform the child of what you are about to do before doing it
- You may have to move the lids (shown in the figure below) to see the parts of the eye hidden by the eyelids.

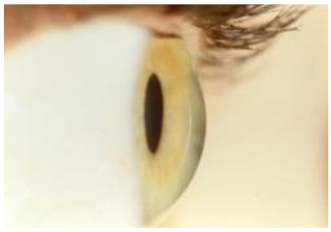
Penlight examination of the outside of the eye and examination of the eye lid conjunctiva
Photo courtesy Brien Holden Vision Institute

STRUCTURE	APPEARANCE OF THE NORMAL EYE
Eyelids	The normal **eyelids**: • open and close properly • look **clean** – no scales or dried pus • look **smooth** with no lumps • have **lashes that turn away** and not scratching the inner structures of the eye • do not look red, puffy or swollen.
Cornea	The corneal must be transparent and shiny
Conjunctiva	There are two parts to the conjunctiva: Bulbar conjunctiva that covers the front part of the sclera which should: • look clear and smooth • let the whiteness of the sclera show through • show only a few small blood vessels • show no red parts or bumps • show no pus, watering nor bleeding. The eyelid conjunctiva that covers the inside of the eyelids which should: • be smooth and pinkish, not red • not have bumps, lumps or growths • no have foreign bodies.
Sclera	• The white of the eye should be white in colour
Pupil	The pupil should: • be black, round, equal in size and central • **get smaller** when light is shone into the eye • **get bigger** when light is taken away from the eye.

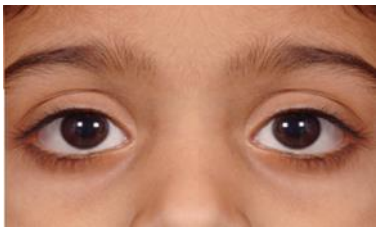
SIGNS OF HEALTHY EYES

If you notice any problems with eye health, then REFER the patient.

The conjunctiva should be clear showing the white color of the sclera and fine blood vessels
Photo courtesy Brien Holden Vision Institute

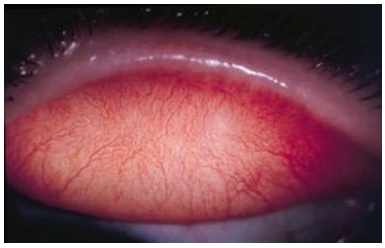


The cornea must be transparent and shiny
Photo courtesy Brien Holden Vision Institute



The eyes should be straight
Photo courtesy Brien Holden Vision Institute

The conjunctiva should be clear showing the white color of the sclera and fine blood vessels
Photo courtesy Brien Holden Vision Institute



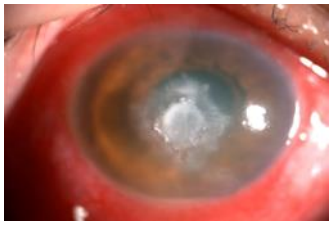
The eye lid conjunctiva should be pinkinkish and not be red, shows bumps or lumps. Photo courtesy Brien Holden Vision Institute

SIGNS OF UNHEALTHY EYES

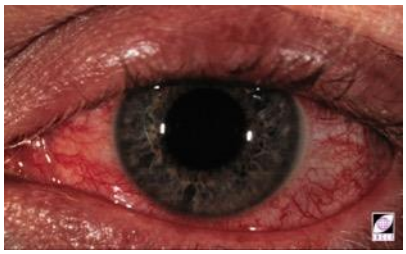
Here are some examples of what unhealthy eyes may look like

Inward turn of the left eye
Photo courtesy of Brien Holden Vision Institute Global Optometry

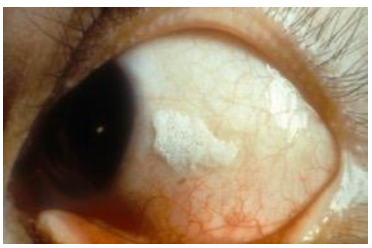
White pupil
Photo courtesy of LV Prasad Eye Institute



Diseased cornea that is not transparent
Photo courtesy of LV Prasad Eye Institute



Red bulbar conjucntiva and swollen eye lids.
Photo courtesy of IACLE



Bitot's spot from Vitamin A deficiency on conjunctiva
Photo courtesy of international Centre for Eye Health

An eye with discharge, bumps and red conjunctiva from infection
Photo courtesy of International Centre for Eye Health

SUSPICIOUS SYMPTOMS

Teachers and parents should be taught to **look for symptoms and signs** that could mean the child has a refractive error or an eye problem.

They should notice if children:

- hold books very close to their eyes
- sit close to the TV or board
- complain of distance or near blur
- squeeze their eyes half closed when looking at the board
- copy from the child next to them
- poor concentration or behaviour
- If children cannot see clearly they may turn their attention to something else. Their schoolwork may be poor
- leave out words or sentences when reading
- blink or rub their eyes a lot
- twist or tilt their heads to use one eye more than the other
- complain of headaches or eyestrain after they have read for a long time
- poor night vision

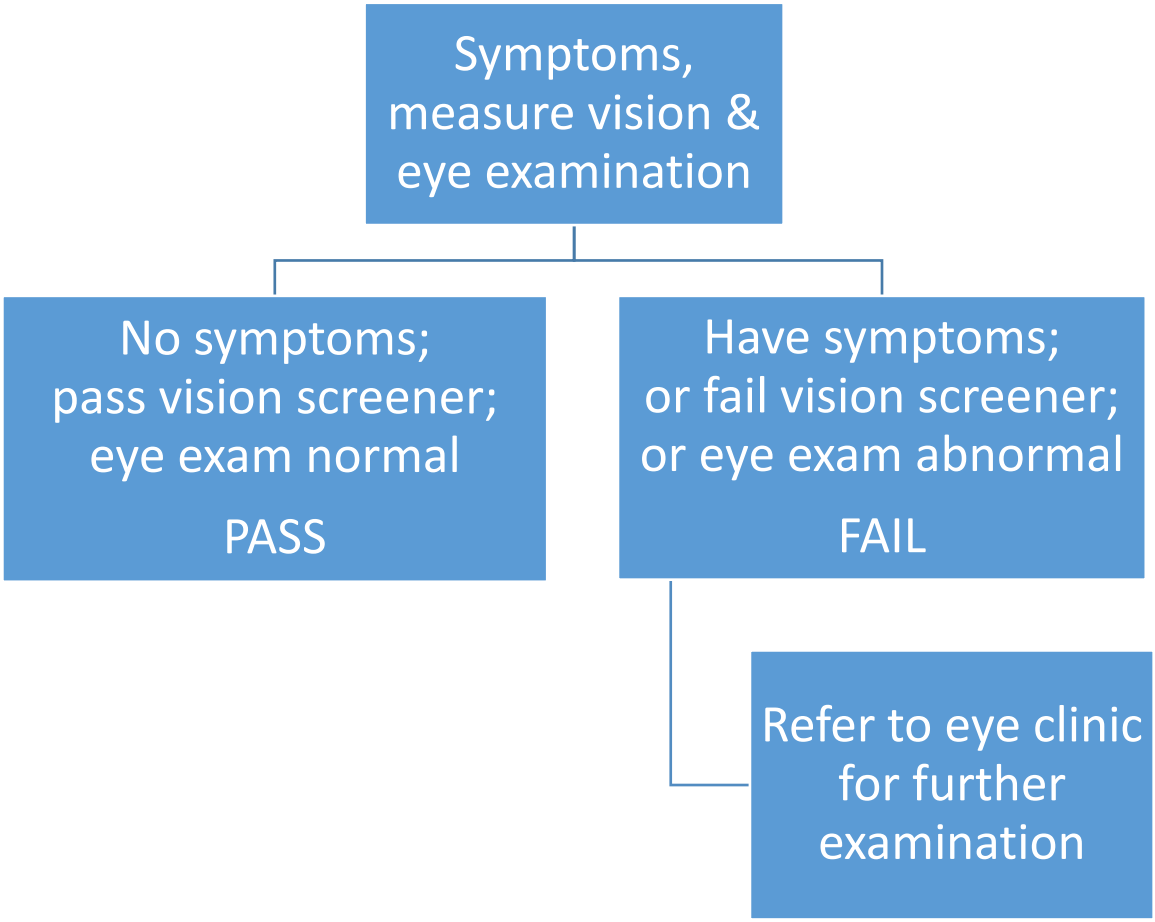
Children with any of the above reported symptoms should be referred for an eye examination. The symptoms should be recorded as part of the reason for referral.

RECORDING THE FINDINGS

The results of the screening should be recorded as either PASS or FAIL for each eye in the Log Sheet. This form should also contain data from the screening, name of the child, age, gender and a column for reason of referrals (see example of form below). A printable version of the Log Sheet appears at the end of this document.

If a child has failed a screening of vision or eye health, then that child should receive a separate referral form to have a comprehensive eye exam.

EYE AND VISION SCREENING FLOW CHART



Disclaimer
While the above protocol seeks to provide a uniform/standardized methodology to conduct vision screenings within the Our Children's Vision campaign, the locally adopted protocol should consider, integrate or adapt it to formal/legal in-country protocols and legislative processes

Referral form

Dear Sir/Madam

Please note that _____ was screened at _____ on __/___/___ (date).

This child is being referred due to problems noted on one of the following areas ticked below:

Vision	
Eye health	
Symptoms	

Please provide a comprehensive eye examination to determine what is required by this patient.

Referred by: _____

Please print name

Country: Screener's name: Grade: Date:	Name of screening site/school: Designation of screener: Contact number:

						Distance VA: Right eye	**Distance VA: Left eye**	**Eye health exam Right eye**		**Eye health exam Left eye**		**Referral**	**Remarks**
No	Class	Name	Family Name	Age	F/ M	**PASS/FAIL**	**PASS/FAIL**	**PASS**	**FAIL**	**PASS**	**FAIL**	**Yes/No**	**Reason for referral** (record symptoms for referral here)

Summary Statistics:

Number failed distance screening		Number failed eye health exam		Number referred for further examination	

Appendix 12. Sample 'Code of conduct for working with children'

Brien Holden Vision Institute Foundation
Code of Conduct for Working with Children

In this document (**Code**), reference to "staff" includes all employees, contractors, consultants and volunteers of the Brien Holden Vision Institute Foundation (**Institute**).

At the Institute child protection is everybody's business.

Whilst the Code aims to ensure the Institute is a child safe organisation and provides a child safe, inclusive and respectful environment for children who are beneficiaries of our programs and activities, the principles behind the Code extend to the protection of all children by encouraging our staff to continue to have safe and respectful interactions with children and young people in and out of the work place.

The Code provides a practical guide to prevent child abuse occurring within the organisation and incorporate risk management strategies. These strategies will assist everyone to understand their child protection responsibilities, maintain a positive work environment and also create safe environments where children are protected and enabled to survive and thrive.

Staff are responsible for maintaining a professional role with children, which means establishing and maintaining clear professional boundaries that serve to protect everyone from misunderstandings or a violation of the professional relationship.

All staff should conduct themselves in a manner consistent with their role as an Institute representative and a positive role model to children. The Institute has developed the Code to protect children, staff and the Institute by providing clear behavioural guidelines and expectations. The Code is to be signed by all Institute staff.

As an Institute representative, **I WILL**:

- Treat all children and young people in our programs with respect, regardless of race, colour, gender, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status
- Conduct myself in a manner that is consistent with the values of the Institute
- Provide a welcoming, inclusive and safe environment for all children, young people, parents, staff and volunteers.
- Comply with and observe the laws, customs and traditions of countries I work in or work with. In cases where this contravenes the United Nations Convention on the Rights of the Child **(UNCRC)**, the UNCRC will be upheld.
- Encourage open communication between all children, young people, parents, staff and volunteers and have children and young people participate in the decisions that affect them.
- Immediately report any concerns or allegations of child abuse or child exploitation in accordance with the Institute's procedures, including if I observe any concerning behaviour of colleagues
- Take responsibility for ensuring that I do not place myself in positions where there is a risk of allegations being made, e.g. by ensuring that another adult is present when working within the vicinity or proximity of children.
- Self-assess my behaviours, actions, language and relationships with children.
- Use common sense to avoid actions that are abusive or exploitative of children or could be construed as such.
- Speak with my manager about any concerns I have of my involvement in any situation that could be, or be misinterpreted as a breach of the child protection policy.
- Only photograph, film, or otherwise record the image of a child with the consent of the child and his/her parents or guardians, and only after explaining to the child and his/her parents and guardians the purpose of the photograph, film or recording. In relation to such activity, I will also:
    - assess and endeavour to comply with local traditions or restrictions for reproducing personal images before photographing, filming or recording the image of a child;

- ensure that any photographs, films or other recording of children presents them in a dignified and respectful manner and not in a vulnerable, submissive or sexually suggestive manner;
- limit the number of photos so as to be reasonable and not indignify or disrespect the child
- ensure all images of children are honest representations of the context and the facts;
- ensure file labels, meta data or text descriptions of images do not reveal any personal information about a child when communicating or publishing images in any form; and
- refrain from taking photos that I intend to sell or use for other personal purposes (such as sharing on personal social media sites)

✓ Immediately disclose to the Institute all charges, convictions and other outcomes of an offence that relates in any way to the exploitation or abuse of children, whether occurring before or during my association with the Institute.

As an Institute representative, **I WILL NOT**:

- Engage in behaviour that is intended to harass, shame, humiliate, belittle or degrade children.
- Use inappropriate, offensive, abusive or discriminatory language when speaking with a child or young person.
- Do things of a personal nature that the child can do for themselves, such as assistance with toileting or changing clothes.
- Invite unaccompanied children to my own home/hotel (unless they are at immediate risk of injury or physical danger) or sleep in the same room or bed as a child.
- Smack, hit or physically assault children.
- Act in a sexually provocative manner, or engage children in any form of sexual activity, including by paying for sexual services or acts involving children, regardless of perception of age or development.
- Develop relationships with children that may be deemed exploitative or abusive.
- Condone or participate in, behaviour of children that is illegal, unsafe, exploitative or abusive.
- Act in a way that shows unfair and differential treatment of children.
- Hold, kiss, cuddle or touch a child in an inappropriate, unnecessary or culturally insensitive way.
- Seek to make contact (including using social media) or spend time with any child or young person involved in Institute programs outside program times.
- Use any computers, mobile phones, video, cameras or social media inappropriately, nor use them for the purpose of exploiting or harassing children or accessing child exploitation materials through any media.
- Hire children for domestic or other labour which is inappropriate given their age or developmental stage, which interferes with their time available for education and recreational activities, or which places them at significant risk of injury.

I have reviewed the Brien Holden Vision Institute Foundation Working with Children Code of Conduct and I agree to adhere to these standards throughout my association with the Institute.

_____	_____
Signature	**Witness Signature**
_____	_____
Name	**Witness Name**
_____	_____
Date	**Date**

Appendix 13. Recommended guidelines for comprehensive eye examinations of children referred to eye care providers for school age children

History

- Nature of the presenting problem, including diagnosis, visual difficulties, and chief complaint
- Visual and ocular history, including family ocular history
- History of premature birth
- General health history, pertinent review of systems, family medical history
- Medication usage and medication allergies
- Social history
- Vocational, educational, and a vocational vision requirements (i.e. needs assessment)

Visual function assessment

- Distance visual acuity
- Near visual acuity
- Contrast sensitivity testing, monocular and binocular (where available)
- Colour vision
- Confrontational visual field
- Central visual field

Refraction

- Objective refraction (including cycloplegic)
- Subjective refraction (including cycloplegic)
- Assessment of present spectacles and low vision devices

Ocular motility and binocular vision assessment

- Ocular excursions
- Assessment of ocular alignment
- Sensorimotor testing
- Cover test and prism cover test
- Effects of lenses, prisms, or occlusion on visual functioning

Eye examination findings

- Direct and indirect ophthalmoscopy
- Slit lamp biomicroscopy

Appendix 14. Tips for dispensing spectacles for children

Spectacle frames

Young children do not have a bridget to their nose. Spectacle frames for children must be selected carefully. The characteristics of good children's frames are:[1]

A larger frontal angle(Figure 1) i.e., the angle formed by a line parallel to the rim of the frame where it rests on the nose and the perpendicular line dividing the nose in two (viewed from directly in front). Metal frames with pad arms allow the frontal angle to be adjusted.

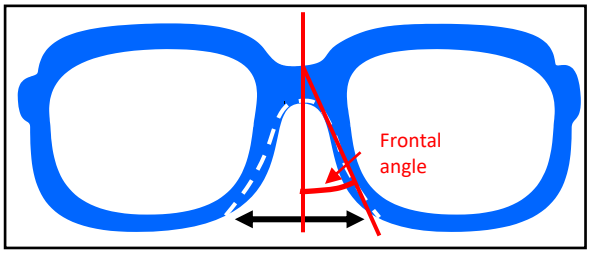


Figure 1. Frontal angle

A larger splay, see Figure 2 (The angle formed by a line parallel to the rim of the frame where it rests on the nose and the perpendicular line dividing the nose in two (viewed from above).) Metal frames with pad arms allow some flexibility in adjusting the splay.

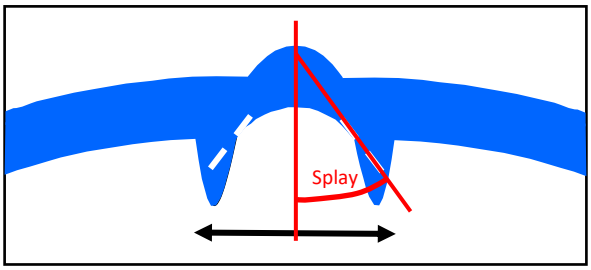


Figure 2. Splay

A flatter pantoscopic angle (Figure 3)(i.e., the angle at the vertical plane between the optical axis of a lens and the visual axis of the eye in the primary position (horizontal)—with the lenses tilted forward.

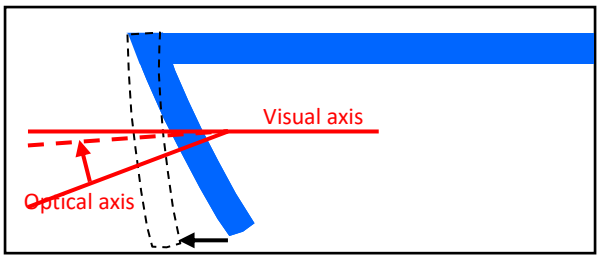


Figure3. Pantoscopic angle

A lower crest (crest height is the distance from the horizontal centreline to the crest of the frame)(Figure 4).

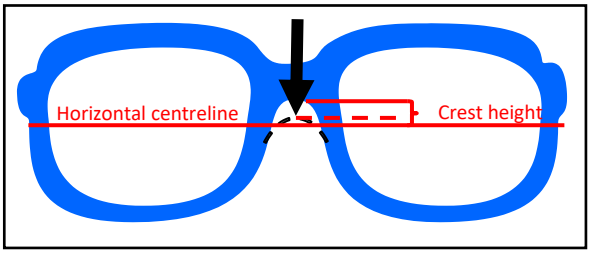


Figure 4. Crest height

Ability to shorten sides (sometimes referred to as temples). The plastic covering the end of the side can be removed, the wire cut to shorten the side, and the plastic refitted.[2] The angle down (see Figure 5) should not extend beyond the ear lobe.

Figure 5. Angle down

Spring hinges. The frame is less likely to go out of adjustment if the child takes the spectacles of with one hand. Also, the frame will absorb some of the impact if hit by an object such as a ball.

In addition to the above characteristics:
a) Make sure that the frames have no sharp edges which may cause injury if the frame is struck.
b) Match the frame width to the child's face. Avoid choosing a frame that they can "grow into".

A frame that is too wide will be easily knocked off, and will result in thicker lenses than necessary. Children are also likely to reject oversized frames.

Lens material

The ideal lens material should be:[1]

- Impact resistant – do not use glass lenses. Scratches on lenses reduce impact resistance. Lenses should be replaced regularly or if badly scratched.
- Light and comfortable (all plastic lens materials meet this criterion).
- Able to cut out ultraviolet (while polycarbonate is the most effective material in cutting ultraviolet all plastic lenses perform adequately).
- Relatively thin. If possible higher refractive index plastic materials should be used for higher powers.
- Relatively durable. When coated all plastic materials perform adequately.

The best option for children is polycarbonate. Where this is not available CR-39 (also known as ADC* or allyl diethyleneglycol carbonate) is an acceptable alternative. Some ready-made spectacles may have acrylic plastic lenses; this is also acceptable.
* This is the preferred term in standards documents[3] because it is not proprietary.

Ready-made spectacles

Ready-made spectacles in low to moderate plus powers have been used for many years as a simple means of correcting presbyopia. They are now available in powers from −6.00 D to +6.00 D, making them useful for correcting distance refractive errors in children. They are usually available in both metal and plastic frames with plastic lenses.

Ready-made spectacles are suitable for children where:

1. anisometropia (the difference between the two eyes) is less than 0.50D
2. astigmatism is less than or equal to 0.75 D
3. prescribed prism is less than or equal to 0.5Δ[4]
4. the spectacle frames available are of suitable size

Ready-made spectacles should preferably be limited to powers less than or equal to ±3.50 D with the exception of outreach programs.* If powers outside this range are used then full quality assurance checks should be carried out where possible.[5]

Ready-made spectacles of less than or equal to ±3.50 D should be checked visually for faults and flaws, notably surface waves.[5] #

* Delivery of custom-made spectacles back to outreach sites can be difficult, therefore a wider range of ready-made spectacles may be needed for such programs.

\# Powers of less than or equal to ±3.50D are relatively unlikely to fail on criteria requiring measurement by a focimeter. Therefore, focimeter checking for powers within the range −3.50D to +3.50D is not required; a brief visual inspection wills suffice.[5]

Ready-made spectacles should be an appropriate physical fit and be adjusted to suit the wearer by a trained person.

If children are to be prescribed ready-made spectacles they should be of an appropriate size and particular consideration should be made of the PD.

Ready-made spectacles should be cosmetically acceptable.

Ready-made spectacles should be supplied under the guidance of a qualified practitioner, and only when custom-made spectacles are not available or affordable.

Ready-to-clip spectacles

Ready-to-clip spectacles are also available now where spherical lenses of different powers can be clipped into a specially made frames. These provide a solution where there refractive error between the two eyes are not the same as different lenses can be used. However, problems with induced prism due to mismatch of interpupillary distances described above still apply and hence, usage is better limited to prescriptions below 3.50 D. There is also the addition of potential anisekonic effects if the difference in power between the lenses are too high (> 2.00 D). It is recommended that if both eyes have different prescriptions, that only differences of less than 2.00 D be prescribed between the eyes.

Recycled spectacles

Recycled spectacles are used spectacles donated by members of the public. The International Agency for the Prevention of Blindness (IABP)[6] recommended that groups involved in eye care should not accept donations of recycled spectacles nor use them in their programs as “no amount of efficiency and effectiveness in the delivery chain can justify the output and outcome of this recycling scheme.”

Adjustable spectacles

Several types of self-adjusting spectacles are available. However, self-correction involves trial and error and bypasses clinical refraction. Self-refraction can lead to overcorrection of myopia, under correction of hyperopia as a result of accommodation[7] and cannot correct astigmatism. Self-adjustment should not be used in school eye health programs unless they are used under the supervision of suitably trained eye care personnel to prevent over- or under-correction of refractive error. The IAPB position paper states that while these type of spectacles may be a solution to correction of refractive error, they should meet optical standards and be supplied only in conjunction with an eye examination by trained eye care personnel. (https://www.iapb.org/wp-content/uploads/Position-Paper-on-Self-Refraction-with-Adjustable-Spectacles.pdf)

Custom-made spectacles

Custom-made spectacles require access to an edging and fitting workshops and access to uncut spectacle lenses and spectacle frames. They are the ideal solution to refractive error, particularly in cases of significant astigmatism or anisometropia. However they are more costly since they are more labour intensive and require a production facility.

Spectacle frames

The appearance and comfort of spectacle frames are essential. Children must be comfortable about wearing their spectacles which is assisted by allowing children to choose the frames they prefer from a range of metal and different coloured plastic frames. Gender has also been identified as a perceived barrier in use of spectacles.[8-10]

Prescription of spectacles should be accompanied with health promotion especially with peers, teachers and parents.

References:

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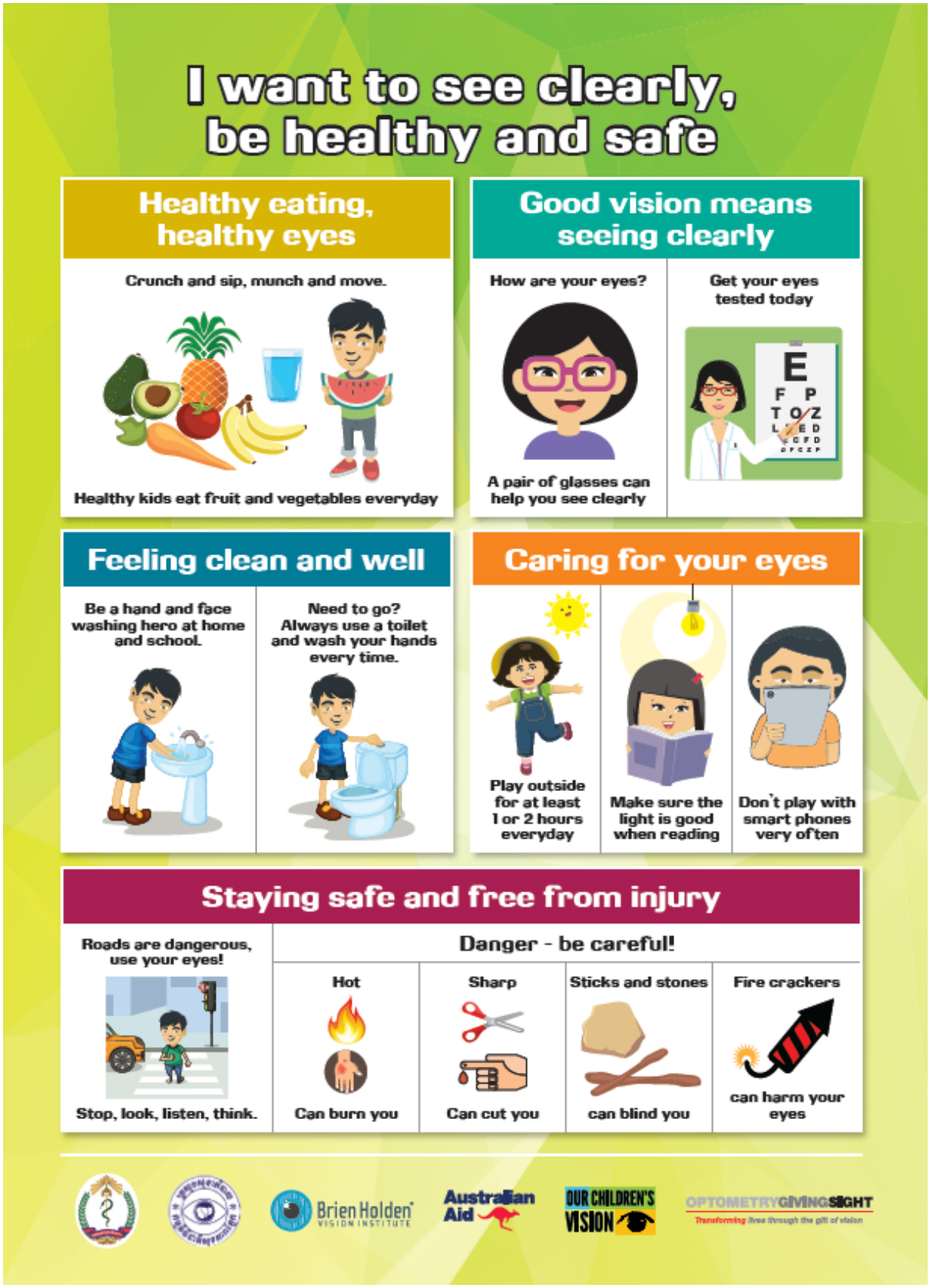
9. Terry, RL. Eyeglasses and gender stereotypes. Optometry & Vision Science 66, 694-697 (1989).
10. Harris, MB. Sex differences in stereotypes of spectacles¹. Journal of Applied Social Psychology 21, 1659-1680 (1991).

Appendix 15. Example of eye health promotion poster



Appendix 16. Relevant online resources

Web links	
Child-to-Child approach	http://www.childtochild.org.uk/
Education for all campaign	http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-all/
Healthy eyes activity book	http://www.sightandlife.org/fileadmin/data/Books/heab_new_e.pdf
Hong Kong Society for the Blind	http://www.hksb.org.hk/en/
International Diabetes Federation	http://www.idf.org/
IAPB Position Papers	https://www.iapb.org/news/iapb-position-papers-on-spectacles-readymade-adaptable-and-recycled/
IAPB Standard List	http://iapb.standardlist.org/
Low Vision Online	http://www.lowvisiononline.unimelb.edu.au/index.htm
Our Children's Vision	http://www.ourchildrensvision.org/
Trachoma atlas	http://www.trachomaatlas.org/
Trachoma coalition	http://www.trachomacoalition.org/
WHO – Vitamin A deficiency	http://www.who.int/nutrition/topics/vad/en/
UNICEF: Rights of the Child	http://www.unicef.org/rightsite/
UN Millennium Development Goals	http://www.un.org/millenniumgoals/
UN Sustainable Development Goals	http://www.un.org/sustainabledevelopment/sustainable-development-goals/