Integrating eye health into school health programmes can provide comprehensive eye health services to millions of children all over the world.

Primary education is a fundamental human right. It has the potential to change individuals’ lives and fuel social transformation. Good health is critical for achieving a sound education and a bright future for a child. Vision is an integral part of a child’s health and poor vision can have long-term impact on their social, cognitive and physical development. An estimated 1.26 million children are blind around the world. Furthermore, 19 million children are visually impaired, including 12 million with uncorrected refractive error—they just need spectacles. This issue of Community Eye Health Journal - South Asia edition brings you several initiatives to improve children’s eye health through school based interventions that have proven to be successful. The WHO programme on School and Youth Health notes that, “An effective school health programme can be one of the most cost effective investments a nation can make to simultaneously improve education and health.” Integrating eye health into school health programmes can provide comprehensive eye health services to millions of children all over the world.
About this issue

School eye health programmes have the potential to change the lives of school children and their teachers by detecting eye conditions and ensuring access to quality eye care. Health education delivered at schools also has the potential to reduce eye disease and visual impairment in the future. Comprehensive programmes should be undertaken in collaboration with ministries of health and ministries of education, and need to be monitored and evaluated to ensure they are a good use of resources and bring about positive change. Guidelines have recently been produced to help plan, implement, monitor and evaluate school eye health programmes.

Contents

1 School eye health in South Asia Dr Damodar Bachani
4 Overview: Importance of integrating eye health into school health initiatives Dr Rohit C Khanna and Dr GV'S Murthy
7 Common eye diseases in school going children Dr P Vishalakshi and Dr Sanjay R. Prasad
9 Developing an integrated school eye health programme in Pakistan Sumran Askari, Faisal Saifullah and Hasan Minto
12 Hospital-based community eye health programme: A model for elimination of avoidable blindness on a sustainable basis Kashinath Bhoskarunath
16 REACH: An innovative model for child eye health Dr Rohit A4
18 School eye health in Nepal: A holistic model of care Szilvia Traian, Sudhir Thakur and Marques Anwar
21 School eye health services in Sri Lanka: An innovative way of approaching eye health in children Dr Sanjay Kumar Singh and Sudhir Thakur
23 Importance of colour vision testing in school based eye health examination Ashokul Jadhav, Prem Kumar SG and Sabita Kundu
24 Mission Rotshi: Light up the world of India’s children Shubhrakanti Bhattacharya, Sabita Kundu, Prem Kumar SG and Elisabeth Kurian
26 Children’s eye health programmes: Successful strategies and challenges Asha Latha Metlita, Srinivas Mamaru and Rohit C Khanna
29 Picture quiz
31 Announcements and resources

32 KEY MESSAGES

A successful school eye health programme needs to include eye health education, early detection, referral and treatment. Preventive interventions can address conditions such as conjunctivitis and eye injuries among children. With early detection, conditions like cataract and uncorrected refractive error can be treated on time, leading to improved quality of life. With teachers working closely with children on a day-to-day basis, training and integrating teachers into school eye health programmes can also help identify children with low vision.

This issue begins with an overview that looks at a range of school eye health interventions in South Asia. These interventions highlight the importance of including eye health in school health programmes. Successful eye health programmes in South Asia illustrate experiences of implementing school eye health initiatives and attempt to go beyond screening for refractive errors. In Pakistan, a school health eye programme involved engaging multiple stakeholders, leading to improved access to eye health services for children in rural communities.

An eye health programme in Nepal used a holistic approach involving eye screening, health education and promoting inclusive education in schools. This approach promoted inclusive education for children with disabilities through advocacy for accessible ramps, appropriate classroom settings and sensitisation of children, adults and teachers to the needs of visually disabled children.

In Sri Lanka, mandatory periodic school medical inspections for all children and provision of free spectacles proved to be a successful strategy. Training teachers to conduct initial screening of children in Indian schools showed that teachers can become advocates for child eye care in school as well as in their communities. Other models of eye care for children applied in different parts of South Asia are showing promise in reaching out to school aged children. A hospital-based community eye health programme in India reached out to children below five years and school children. This model of eye care delivery helped in empowering people, including children, living in the service area of the hospital leading to an improvement in eye health-seeking behavior and delivery of quality eye care services. In Uttar Pradesh, the most populous state in India, a school eye health programme used a clustered approach to reach out to a large population.

Uncorrected refractive errors, headache and asthenopia, strabismus and amblyopia, developmental cataract, inherited retinal dystrophies and globe anomalies and ocular allergies are some of the ocular problems among school aged children in the region. A brief summary of such conditions, diagnosis and methods of treatment may help in early screening and diagnosis of common eye health problems.

Through cost effective measures many eye conditions in children are avoidable. A lot can be achieved through school eye health programmes by including health education, which promotes healthy behaviour and leads to early detection and referral of children with eye problems. Engaging various stakeholders such as ministries of health, NGOs active in education and communities will make a school eye health programme sustainable. With this issue we hope to promote the inclusion of eye health in all school health programmes in the South Asia region.

Prominent contributors

Dr Sanjay Kumar Singh, Sudhir Thakur and Afaque Anwar
Dr Rahul Ali
Kashinath Bhoskarunath
Srinivas Mamaru and Rohit C Khanna

Address for subscriptions
Community Eye Health Journal South Asia, Indian Institute of Public Health, Plot no.1, A/W Arcade, Agra, Uttar Pradesh 282001, India
Tel: +91-45-48900500
Email editor@cehjournal.org

South Asia Advisory Committee

Address for subscriptions
Community Eye Health Journal South Asia, Indian Institute of Public Health, Plot no.1, A/W Arcade, Agra, Uttar Pradesh 282001, India
Tel: +91-45-48900500
Email editor@cehjournal.org

Correspondence articles
We accept submissions of 800 words about readers’ experiences in eye health. Contact: editor@cehjournal.org

Published by the International Centre for Eye Health, London School of Hygiene & Tropical Medicine.

Unless otherwise stated, authors share copyright for articles with the Community Eye Health Journal. Illustrations and photographs remain copyright for images published in the journal. Unless otherwise stated, journal content is licensed under a Creative Commons Attribution Non-Commercial (CC BY-NC) license which permits unrestricted use, distribution, and reproduction in any medium for non-commercial purposes, provided that the copyright holders are acknowledged.

ISSN 0953-6833

Disclaimer
Signed articles are the responsibility of the named authors alone and do not necessarily reflect the views of the London School of Hygiene & Tropical Medicine (LSHTM), the School’s Directors or the University of Oxford. LSHTM does not endorse or recommend the use of any products, products or services for which you may view advertisements in this journal.

The School does not endorse or recommend the use of any products, products or services for which you may view advertisements in this journal.
Importance of integrating eye health into school health initiatives

A comprehensive school eye health programme includes health promotion and prevention activities; activities to increase awareness about eye health among children; screening, detection and treatment of common eye conditions (URE, infections, squint, etc.) in these children.

Recent estimates show that there are 1.26 million children who are blind and 19 million children who are visually impaired, including 12 million with uncorrected refractive error, globally. Uncorrected refractive error (URE), especially myopia is one of the major causes of vision impairment and blindness. Prevention, recognition, referral and treatment of a child for eye diseases is linked with the United Nations Sustainable Development Goals (SDGs). There is a changing trend in magnitude and causes of childhood blindness (CB), in developing countries. Widespread nutritional and immunisation programmes, have reduced infections and micronutrient deficiencies while other conditions like childhood cataract, glaucoma, retinopathy of prematurity (ROP), uncorrected refractive error (URE) are on the rise. According to a recent estimate, there are 312 million children around the world affected by myopia and this is set to increase to 324 million by 2025.

In South Asian countries URE is one of the major causes of visual impairment in children. The prevalence of URE in children in South Asia increases with age from an estimated 5.3% (95% CI: 2.9-9.6) at 5 years to 9.2% (95% CI: 5.2-15.7) at 10 years and 13% (95% CI: 7.4-21.6) at 15 years of age. As most of these children with visual impairment (VI) can be identified in schools, school vision testing for eye health is one of the major programmes in some of these countries.

Table 1 shows the prevalence of URE (including myopia) as well as other eye conditions identified and the proportion wearing spectacles in different school vision testing programmes in countries in South Asia. The Indian Government has a strong commitment to school health programmes, including eye health. Since 1994, school eye testing is an integral part of the National Programme for Control of Blindness (NPCB). Under the national programme, where is implemented through District Health Societies (DHS), 7.57.906 pairs of spectacles were provided between 2016-2017.

Recently, the Ministry of Health and Family Welfare, Government of India launched the Rashtriya Bal Swasthya Karyakram (RBKSK- National Child Security Programme) under the National Health Mission (NHM). This is an ambitious programme, which envisages child health screening, including eye screening. The aim of this programme is early identification and treatment of four Ds: defect at birth, deficiencies, diseases and developmental delays, including disability.

Efforts have been made in Pakistan by government and non-government partners to work together. Initial efforts took place in partnership with district health and education departments and Al Ibrar Eye Hospital in Malir, Sindh Province in 2011. The programme ensured integration of eye health services into existing health and education systems. Based on this learning, the second phase has been initiated. However, there is limited information on similar commitment or initiative taken in other countries in South Asia.

Most of the school eye health programmes in these countries are due to the efforts of International Non-Governmental Organisations (INGOs) like Brien Holden Vision Institute (BHVI), Orbis, Sight savers, Mission for Vision (MFV), CBM and others. Apart from this, there are limited programmes for children who are enrolled in special schools or for school dropouts. Some of the countries like Bangladesh have used the Key Informant (KI) approach. KI generally refers to a group of volunteers who have a brief training in identification of children with VI in underserved and difficult to reach areas. They usually work in campaign mode. Apart from this, the other approach used is identification by community based rehabilitation (CBR) workers as well as in schools for the blind or special schools.

For effective delivery of eye care services through school eye health programmes in South Asia, there is a need to involve ministries of education and health, communities and national and international NGOs. A comprehensive school eye health programme includes health promotion and prevention activities; activities to increase awareness about eye health and screening, detection and treatment of common eye conditions (URE, infections, squint etc.) in these children. Access to a school eye health programme is also important for the following reasons:

- Educating children about good eye health practices including dietary practices to prevent vitamin A deficiencies, facial cleanliness to prevent trachoma as well as outdoor play for prevention of myopia.
- Screening can aid in early detection, referral and intervention, which helps improve educational attainment as well as have a positive psychosocial impact, including overall personality development.
- This is also an opportunity to screen school teachers for conditions like URE, presbyopia, cataract, glaucoma, diabetic retinopathy and so on.

The following are recommended for development of a good school eye health programme:

- Generate evidence for advocacy, emphasising the importance of school eye health.
- Engage Ministries of Health and Education for school health, including eye health initiatives.
- Promote healthy schools: i.e. health education (including eye health education) to be part of regular school curriculum.
- Promote healthy school environment and practices.
- Identify human resources needed for each level of care and define their roles and responsibilities.
- Develop systems for training including training of teachers / vision champions / volunteers.
- Use appropriate technology, including instruments and equipment.
- Have a mandatory and periodic vision screening programme in the school.

Table 1 Prevalence of Uncorrected Refractive Error as well as other eye conditions in South Asia

<table>
<thead>
<tr>
<th>Country</th>
<th>Region</th>
<th>Year</th>
<th>Age group (years)</th>
<th>Number of children</th>
<th>Prevalence of URE in either eye (%)</th>
<th>Myopia (%)</th>
<th>Other conditions identified</th>
<th>% already wearing spectacles</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>Delhi (Rural)</td>
<td>2012</td>
<td>11-18</td>
<td>1075</td>
<td>11.4</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>India</td>
<td>Delhi (Urban)</td>
<td>2015</td>
<td>5-15</td>
<td>9884</td>
<td>14.5</td>
<td>13.1</td>
<td>NA</td>
<td>24.7</td>
</tr>
<tr>
<td>India</td>
<td>Maharashtra (Urban)</td>
<td>2009</td>
<td>5-15</td>
<td>5021</td>
<td>5.46*</td>
<td>3.16</td>
<td>Amblyopia (41, 0.8%), cataract (4), corneal opacities (6), retinal diseases (4), squint (1), others (4: chorioretinitis, microcornea, nystagmus)</td>
<td>3.65</td>
</tr>
<tr>
<td>India</td>
<td>Maharashtra (Rural)</td>
<td>2009</td>
<td>5-15</td>
<td>7401</td>
<td>2.63*</td>
<td>1.45</td>
<td>Amblyopia (17, 0.2%), cataract (2), corneal opacity (2), retinal dx (2)</td>
<td>4.6</td>
</tr>
<tr>
<td>India</td>
<td>Hyderabad (Urban)</td>
<td>2009</td>
<td>7-15</td>
<td>1789</td>
<td>19.5</td>
<td>NA</td>
<td>Trachoma (0.16%), night blindness (0.33%), strabismus, amblyopia, cataract, retinal diseases and corneal opacity</td>
<td>11.6</td>
</tr>
<tr>
<td>India</td>
<td>Hyderabad (Rural)</td>
<td>2009</td>
<td>7-15</td>
<td>1525</td>
<td>6.3</td>
<td>NA</td>
<td>Trachoma (3.5%), night blindness (3.2%),strabismus, amblyopia, cataract, retinal diseases and corneal opacity</td>
<td>9.8</td>
</tr>
<tr>
<td>Nepal</td>
<td>Bhaktapur and Lalitpur distr.</td>
<td>2013</td>
<td>5-16</td>
<td>2000</td>
<td>8.6</td>
<td>6.85</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Nepal</td>
<td>School for the deaf, Kathmandu</td>
<td>2005</td>
<td>6-25</td>
<td>253</td>
<td>11.86</td>
<td>NA</td>
<td>Ocular morbidity (22.52%), Strabismus (7), refractive error (32), abnormal colour vision (6), night blindness (6), corneal ulcer or scar, glaucoma suspect and amblyopia</td>
<td>NA</td>
</tr>
<tr>
<td>Nepal</td>
<td>High Mountain, Nepal</td>
<td>2013</td>
<td>4-18</td>
<td>140</td>
<td>28.5</td>
<td>27</td>
<td>NA</td>
<td>17.5</td>
</tr>
</tbody>
</table>

* NA - not available; NA - Not Available; 0/12-acut or RF;
Common eye diseases in school going children

In this article we present an overview of common eye diseases or ailments identified in school-aged children in South Asia with different ways to screen and diagnose them at schools.

Dr P Vijayalakshmi
Chief Paediatric Ophthalmologist, Aravind Eye Hospital

Dr Sathya T Ravilla Assistant Professor, Aravind Eye Hospital

Myopia is one of the major causes of vision impairment and blindness in school-aged children. PAKISTAN

Common eye diseases in school going children

Apart from refractive errors, the other ocular problems which may be encountered in this age group are:

- Strabismus,
- Amblyopia,
- Developmental cataracts,
- Retinal dystrophies,
- Nystagmus,
- Ocular allergies,
- Vitamin A deficiencies and,
- Trauma-related problems and low vision.

Headache

This is a frequent yet insignificant complaint in this population. However, all children with headache need to be thoroughly evaluated to rule out optic disc edema, refractive error and fusion or accommodative imbalance. Headache and asthenopia due to manifest hypermetropia (MH), insufficient accommodation or poor convergence and fusion can negatively influence a child's academic performance. They may present with blurred vision while reading for near vision tests and face difficulty in changing the focus from near to distance. Manifest hypermetropia is said to be present when a child with unaided visual acuity of 6/6 maintains the same vision even with an addition of +1.5 DS in front of both eyes. Convergence is the mechanism wherein both eyes move towards the nose to focus on near activities. Convergence weaknesses is said to be present when the near point of convergence recedes beyond the normal level of 10 to 12 cm.

Screening for MH can be done by making all children with 6/6 acuity without correction to read the VA chart with +1.5 DS spectacles. Those who can still read 6/6 with the +1.5 DS add need to be referred for refraction and further examination. The amount of convergence can be checked by using a small stick (see picture) printed with a vertical line intercepted by a central dot. The child is asked to focus on the central dot and to notice if the single line tends to appear double, as the examiner slowly brings the stick from 40 cm to 10 cm towards the nose of the child. During the process, the examiner encourages the child to concentrate on the dot, and the examiner looks for any ocular deviation. If the child sees the line as double and/or if a deviation is noticed when the stick is at a distance beyond 10-12 cm, the child needs to be referred to the base hospital for further evaluation. MH is corrected with spectacles, whereas convergence and fusion weakness can be improved with appropriate orthoptic exercises.

Strabismus and Amblyopia

With two eyes set in the straight ahead position, there is an advantage of having a wider field of vision and a capacity of perceiving the depths of different objects (stereopsis or 3D vision). Strabismus is said to be present when one eye deviates from the straight ahead position (see picture showing left esotropia and right exotropia on page 8). It can occur in one eye or alternately in both eyes. Strabismus may be hereditary, but can also occur due to uncorrected refractive errors, paralysis of the nerves involved with ocular movement or due to obstruction of vision in one eye by ptosis, corneal opacity, cataract, etc. If not detected and treated early, it may result in irreversible visual loss in the deviating eye (amblyopia or lazy eye).

Detection and management: The deviation of eyes from primary position can easily be detected by shining a light in one eye with the other eye covered. If there is any ocular deviation, the child needs to be referred to the base hospital for further evaluation. MH is corrected with spectacles, whereas convergence and fusion weakness can be improved with appropriate orthoptic exercises.

References
Nystagmus and low vision

Involuntary or unsteady movements of the eye balls is called nystagmus. Children with nystagmus tend to keep their eyes, face or head turned towards the direction of least eye movements. Nystagmus occurs due to pathology in the eye structures (globe anomalies, retinal dystrophies, etc.) or in the eye movement control system. It is usually associated with poor visual acuity and/or difficulty in reading. A torch light can be used to detect any abnormal eye movements. Infractor or rectifying errors need to be corrected. Where the vision cannot be improved, support to use residual vision to suit their needs by guidance at a visual rehabilitation unit in a secondary/tertiary eye care centre is recommended.

Ocular allergies

Vernal kerato-conjunctivitis or seasonal allergic conjunctivitis can cause great discomfort affecting academic performance. It is characterized by severe itching, discharge and foreign body sensation. It can sometimes lead to refractive errors, mostly astigmatism. Since the course of the disease is long, one should be educated about preventive measures and safe use of drugs and avoiding self-medication, particularly steroids.

Vitamin A deficiency

Presence of Bitot’s spots in this population gains importance only when it is associated with night blindness and other associated nutritional issues. Where necessary, this can be managed with a Vitamin A oral supplementation, as recommended by WHO.

Cataract

Developmental or traumatic cataract is usually detected by a torch light where the pupil either appears grey or white, with associated decreased visual acuity. Treatment by surgical removal of the catactareous lens followed by implantation of a suitable intraocular lens (IOL) may be indicated. It is important to mention that these children will need spectacles post-operatively especially for near vision and long term follow-up with frequent replacement of spectacles.

A vision screening process for detecting uncorrected refractive error should include the following examinations to make it a comprehensive examination:

- Use +1.5 DS test to detect manifest hypermetropia
- During a headache with eye strain, use a target stick to look for convergence insufficiency
- Examine with a torch light, to look for strabismus, nystagmus, white reflex at the pupil (cataract), small or large eye balls, and any other abnormalities in the lids.
- Examination of the conjunctiva to look for bitot’s spots or signs of allergy
- Explain any abnormal findings to the children/parents/teachers and encourage them to undergo further examinations at a designated place.

Challenges

The above examination requires a slightly longer time and some training of the fieldworker. Investing in training of the technician makes the programme more comprehensive. Apart from having sufficient funding, processes need to be in place to keep track of children who need secondary and tertiary care to ensure complete care.

Developing an integrated school eye health programme in Pakistan

The importance of a child’s eye health cannot be underestimated. Poor vision can affect a child’s educational attainment and thereby have a negative impact on a child’s future life. As data from the Sustainable Development Goals suggests, educational attainment has a direct impact on future indicators for individual and (national) economic growth, and, more importantly the health and educational outcomes of children. Eye health is an essential part of a school health programme. It should be comprehensive and respond to a wide range of eye conditions and diseases prevalent in the project area. Given the paucity of human resources for eye health, especially in developing countries, innovative approaches need to be developed and primary eye care components strengthened. This could include training non-clinical personnel like school teachers and community-based workers to undertake basic eye health screening and appropriate referrals to the primary eye health system for further management.

This paper describes the institutional approach to a school eye health programme in Pakistan. The programme engages multiple stakeholders to provide primary eye care and has this led to improved access, especially for children in rural communities.

The estimated population of Pakistan is 195 million1 - 41% of which are below the age of 18 years2 and among them 90% are enrolled at schools.3 More than half of this population lives in rural areas. Pakistan is ranked 147th on the human development index.4 More than one-third of the population lives below the national poverty line. According to the recently conducted Rapid Assessment of Refractive Error in Children in Pakistan (2016-2017) by the Brien Holden Vision Institute, the prevalence of significant refractive error is 5.4% in the age of 5-15 years (in a study submitted for publication). However, no reliable data exists on the prevalence of ocular morbidity in children in Pakistan and it is estimated that more than 10% of the children suffer from some form of ocular morbidity, predominantly due to Conjunctivitis, Trachoma, and Ocular Trauma. In countries like Pakistan, eye care is normally considered a subject of secondary and tertiary health interventions; increasing the cost to patients and the health system. The secondary and tertiary eye health facilities are inadequate and inequitably distributed across the country. The need for the development of primary eye health services is crucial. It requires capacity building of diverse cadres in public and private sectors to strengthen the primary eye health workforce. This needs inter- and intra- departmental partnerships with the public and private sectors, and civil society.

School health and school eye health is neither a prioritised theme for public sector education and health departments nor is eye health integrated in the school health agenda. Only Non-Governmental Organisations (NGOs) are implementing the school eye health (SEH) programmes in collaboration with public sector health and education departments in select geographical locations. In most cases, NGOs work with the education department while implementing their SEH programmes. In Pakistan, a number of other public and private sector organisations that run different types of schools, are normally discounted from such SEH programmes. In order to develop a comprehensive SEH programme that can claim to be inclusive, all such actors need to be involved that are directly or indirectly engaged in education and health interventions. There is a dire need to develop a comprehensive and practical framework that can cater to diverse needs and engage various stakeholders in education and health sectors to deliver integrated school eye health programmes.
School Eye Health Programme

School eye health is an effective strategy for implementing eye care programmes including correction of vision impairment due to uncorrected refractive error. Early intervention can prevent the child from losing vision due to Amblyopia. Given the huge unmet need and lack of standardised approaches to school health in Pakistan, the Brien Holden Vision Institute (the Institute) prioritised SEH as a key focus for its child eye health intervention. The SEH strategy emphasises the following:

- To ensure accessibility of high quality eye health services to all children.
- To actively advocate the importance and integration of school eye health initiatives into existing education and health systems.
- To strengthen the institutional capacity of key stakeholders in planning, implementation, and effective delivery of SEH interventions leading to policy development.

The programme demonstrates the potential for adoption by the government and other eye care and non-eye care development partners.

Roles of various stakeholders

Developing a comprehensive school health programme requires partnerships both at the substructure and superstructure levels. Partnership at the level of superstructure results in ownership of the programme, its sustainability and integration of best practices into the policy discourse. Active engagement at substructure level ensures the effective transfer of knowledge and skills to clinical and non-clinical primary cadres, extensive school screening, community participation, and appropriate referrals.

In the implementation of a SEH programme, diverse organisations can be engaged to reach out to a larger number of children. The table below explains the types and roles of the different organisations engaged in the programme to promote SEH (Table 1).

A comprehensive SEH programme, developed with the active ownership of diverse stakeholders serves the following key functions:

- Links schools, communities, government departments, private sector and civil society organisations.
- Increases early detection of vision impairment among children and facilitates provision of appropriate solutions.
- Raises eye health awareness at school, community and organisation levels.
- Enables children with vision impairment to continue their education.
- Promotes inclusiveness by providing primary eye care to all children regardless of any difference.

In the last three years, through its SEH programme, the Institute has reached 520,000 children including 47% girls by engaging with public and private sector organisations, academia and civil society organisations. The Institute has developed over 25,000 spectacles and 1,300 low vision devices to boys and girls in the programme's geographical areas. Contributing to the broader SEH agenda along with other civil society organisations, the Institute has built the capacities of more than 2,500 diverse cadres including teachers, social workers, NGO employees, hygiene promoters and others in child eye health and vision screening.

Key Lessons

A SEH system needs to be compatible with local culture and policy environment. Factors which facilitated the effective implementation of SEH programmes in Pakistan are:

- Partnership with education and health departments to build synergies; bring ownership, ease of getting necessary approvals, continuity and sustainability.
- Training teachers in primary eye health and appropriate referrals to build a community-based cadre, given the scarcity of human resources for health care.
- Availability of training material in the local language
- Strict implementation of a code of conduct for child protection reduces the risk of harm to children and presents the staff engaged in SEH as positive role models for children.
- Eye health, being a high priority subject, is acceptable to all stakeholders involved in the community development process.
- Media is a valuable partner in eye health awareness especially in rural communities.

Table 1 Type and role of the different organisations engaged in the programme to promote SEH

<table>
<thead>
<tr>
<th>Nature of the organisations</th>
<th>Role in school eye health</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public sector</strong></td>
<td>Integrating eye health into school health and primary health systems</td>
</tr>
<tr>
<td>District Governments</td>
<td>Introducing SEH in schools run by government departments</td>
</tr>
<tr>
<td>School management committees</td>
<td>Permitting different cadres for trainings on SEH to provide primary eye care at department, community and school levels</td>
</tr>
<tr>
<td>Police departments</td>
<td>Generating evidence to further incorporate in policy discourse</td>
</tr>
<tr>
<td><strong>Civil society organisations</strong></td>
<td>Development of demonstration approaches based on best practice</td>
</tr>
<tr>
<td>Local non-governmental organisations (NGOs) working on education, health, hygiene, gender, livelihoods and child rights</td>
<td>Integrating child eye health into community-based projects on education, health, hygiene, sanitation, child rights, and other relevant issues</td>
</tr>
<tr>
<td>International non-governmental organisations (NGOs)</td>
<td>Increasing eye health awareness among communities and schools in the project area</td>
</tr>
<tr>
<td></td>
<td>Promoting SEH in schools run by NGOs and associated communities</td>
</tr>
<tr>
<td></td>
<td>Advocating and lobbying at local levels with education and health departments</td>
</tr>
<tr>
<td><strong>Private sector</strong></td>
<td>Integrating SEH in regular eye and health services</td>
</tr>
<tr>
<td>Social entrepreneurs</td>
<td>School screening and referring children with eye care needs to secondary and tertiary eye health facilities</td>
</tr>
<tr>
<td></td>
<td>Ensuring the availability of affordable and good quality spectacles, frames, lenses and accessories for children of all ages</td>
</tr>
<tr>
<td><strong>Media (print, electronic, social media)</strong></td>
<td>Disseminating information on SEH to broad audiences</td>
</tr>
<tr>
<td></td>
<td>Promoting targeted eye health education and health promotion</td>
</tr>
<tr>
<td></td>
<td>Mobilising the communities in rural areas</td>
</tr>
<tr>
<td><strong>Academia, particularly, health professionals</strong></td>
<td>Integrating SEH in eye health curriculums at all levels</td>
</tr>
<tr>
<td></td>
<td>Facilitating the engagement of optometry and ophthalmology graduates/under-graduates in SEH programmes especially in trainings and outreach activities</td>
</tr>
<tr>
<td><strong>Eye health professional forums</strong></td>
<td>Integrating SEH in eye health curriculums at all levels</td>
</tr>
</tbody>
</table>

Provision of good quality eye care enhances the confidence of children, especially girls. PAKISTAN

Challenges

There were several challenges in implementing this programme and the following lessons were learnt:

- An enabling policy framework to support education and health sector reforms is needed in Pakistan.
- Education and health departments work independently, with little coordination between them. An effective SEH programme requires efficient coordination among key stakeholders.
- Non-availability of data related to schools run by NGOs, social welfare and other departments.
- A mechanism to provide financial assistance to children whose families cannot afford to pay for services including spectacles.
- Developing consensus to implement a broad monitoring, evaluation and learning framework requires considerable discussion.

Continued overleaf
Conclusion
In order to be effective and sustainable, a SEH programme must be integrated within the education and health systems, particularly within the school health programme. It is crucial to engage with diverse stakeholders for the implementation of SEH in low-income countries, especially ones which have large populations and a large number of school-going children. Developing countries also have fewer eye health workers, thus creating a space and need for other cadres to be involved in eye care. Coordination is essential at all levels. Roles and responsibilities need to be clearly defined for this system to function effectively. Integrating SEH into the broader health agenda will also help in the pursuit of Sustainable Development Goals.

References
8. USAID. Operation Eyesight Universal. Hyderabad, India.
11. SHIVAM MAINI/OEU

Hospital-based community eye health programme: A model for elimination of avoidable blindness on a sustainable basis

There is a need for inclusive approach that targets not just the medical causes but also the socio-economic causes of avoidable blindness.

Developing the model
The above analyses led us to the conclusion that there were gaps in the services offered by hospitals and that greater effort was needed to empower the target communities.

Through a pilot project implemented from 2009 to 2013 in southern India, we learned that by empowering people living in the service area of the hospital and improving their eye health-seeking behaviour, while continuing to deliver quality eye care services, hospitals could significantly contribute to the elimination of avoidable blindness on a sustainable basis.

This insight led us to develop and successfully scale up a model, named Hospital-Based Community Eye Health Programme (HBCBHP). This model aims to: 
- Clear the backlog of avoidable blindness cases, and thereby eliminate avoidable blindness from the service area of a hospital or vision centre; 
- Empower target communities and community health workers so that they can address the incidence of blindness and visual impairment.

The projects based on the model are comprehensive and include strengthening hospitals to ensure delivery of quality services; strengthening primary health services, including primary eye care services; and empowering target communities to take ownership and responsibility for their eye health needs. The target communities include school children in the service area of the hospital or vision centre.

Key components of our HBCBHP model
1. Assess the quantity and quality of services currently being delivered by the hospital.
2. Develop an action plan for implementation of the HBCBHP and improving services.

A cataract awareness session. INDIA

Kashinath Bhosnurmath Global Director Programmes Operation Eyesight Universal, Hyderabad, India

A cataract awareness session, INDIA
Target area selection and cluster formation
The target area is the immediate service area of a secondary eye care centre or vision centre. We delineate the target area into clusters by identifying surrounding villages in such a way that any village can be reached within two hours from the most centrally-located village in the cluster. Each cluster has a population of 5,000 to 25,000 people.

Recruitment of community health workers or volunteers and other staff
For each cluster, we recruit two community health workers/volunteers who are part of the target community living within the cluster. They are usually part of the existing public health system, preferably female, with a minimum qualification of secondary school. Other staff include a project coordinator and a data entry operator.

Training community health workers or volunteers and other staff
The community health workers or volunteers and other staff undergo a training programme spread over 10 to 20 days. Training is conducted by trained staff from the hospital, based on a curriculum developed by Operation Eyesight. The training programme focuses on:
- Diseases of the eye, measurement of visual acuity, and classification of blind and visually impaired persons;
- The training programme focuses on:
  - Diseases of the eye, measurement of visual acuity, and classification of blind and visually impaired persons;
  - Avoidable blindness:
    - Cataract
    - Trachoma
    - Refractive errors
    - Childhood blindness
    - Inadequate primary health care services
    - Lack of intake of vitamin rich food
    - Inadequate eye care services
    - Poor eye health seeking behaviour
  - Poverty
    - Low household income
    - Low priority of blindness as a problem
    - Inadequate environmental sanitation or poor personal hygiene
    - Inadequate supply of clean water

Door-to-door surveys
Teams comprising two trained community health workers or volunteers conduct door-to-door surveys in their respective clusters for the entire cluster area using a standard format. The survey lasts two to five months, depending on the population of the area. The survey focuses on identifying people who are blind or visually impaired, with special emphasis on identifying those with cataract, trachoma and refractive errors; assessing people’s knowledge, attitude and practice when it comes to eye health (KAP survey); and assessing the immunisation and antenatal/postnatal care status of the population. Validation of the survey is done on a periodic basis by qualified ophthalmic personnel, and the validated data is computerised by a data entry operator.

Primary health care
We work with relevant community-based organisations, NGOs and government departments to implement maternal and child health care activities with a special focus on immunisation services and maternal clinics for antenatal and postnatal care. We also work with these partners to promote primary and non-formal education.

Hospital care
Community health workers or volunteers and ophthalmic staff running vision centres ensure that all those who require further diagnosis and care present themselves at the base hospitals for surgery or other medical treatment. The staff in the field ensure 100 per cent follow-up.

Monitoring and reporting
Continuous monitoring of all activities is done by the project coordinator on a daily basis, and by the hospital management on a weekly basis. The results of door-to-door surveys and cluster-based implementation plans serve as the basis for monthly and quarterly monitoring by the hospital management. There are over 30 different registers maintained by field staff. These registers are reviewed regularly, and necessary measures are taken to ensure projects stay on track.

Cluster-based annual action plans
Each community health worker or volunteer is assisted to develop a cluster-based annual action plan. This is based on the results of the door-to-door survey and tailored to meet the specific needs of the target community. These plans serve as the basis for all the work undertaken by the workers/volunteers and ultimately contribute to achievement of the project’s specific objectives. A project problem tree guides the development of these plans (Figure 1).

Community eye care
The following activities are undertaken mainly by the community health workers or volunteers with support from the base hospitals:
- Screening programmes: eye check-ups, treatment for minor ailments and referral to the vision centre and/or base hospital for appropriate care.
- Implementation of social marketing strategies to encourage target communities to access eye care services being provided by the hospitals.
- Implementation of health promotion and education activities to increase eye care awareness.
- Training of self-help groups in eye care.
- Creation of village vision committees to help identify and refer patients and ensure those needing eye care services access treatment.
- Community-based rehabilitation for those with incurable blindness or visual impairment or other disabilities.

Sustainability
The community health workers or volunteers together with the primary eye care vision centres (which are linked vertically to secondary hospitals) ensure sustained delivery of appropriate care to target populations beyond the project’s duration. Community-based action groups, such as village vision committees, women’s groups and youth groups, are trained and encouraged to work with community health workers to increase community participation and ensure the project reaches as many people as possible. We also network with relevant government programmes and public health departments to ensure they will provide the required support to hospitals after the projects have ended.

No permanent positions are created for these workers. However, we ensure that the project workers are trained and encouraged to work with the community health workers to increase community participation and ensure the project reaches as many people as possible. We also network with relevant government programmes and public health departments to ensure they will provide the required support to hospitals after the project has ended.
Participating hospitals have seen an increase of up to 55 per cent in direct walk-ins from the project areas as compared to pre-project days. These increases are due to the timely provision of effective interventions and the opportunity to recognise that the root causes of avoidable blindness are a golden experience for a child in need.

**Results**

- Eighty-five per cent of the primary eye care centres are financially sustainable.
- About 70 per cent of the patients who participate in screening programmes and receive treatment are those who were identified during a door-to-door survey and attended health promotion events conducted by community health workers. The remaining 30 per cent of identified patients are counselled at their homes by community health workers, village leaders, etc., and they too eventually undergo treatment (Table 1).
- Surgical conversion rates range between 75 and 92 per cent, and spectacle conversion rates are over 90 per cent.
- Participating hospitals have seen an increase of up to 55 per cent in direct walk-ins from the project areas as compared to pre-project days.

**Conclusion**

Operation Eyesight has developed a model that is effective in eliminating avoidable blindness on a sustainable basis, benefiting children and adults alike. By targeting the root causes of avoidable blindness and tailoring our projects to the specific needs of the community, we are able to provide much-needed services that lead to improved eye health and general health for children both within and outside the school system. After successfully piloting our HBCEHP in India, we have expanded our model to other areas of South Asia and Africa where we will continue to prevent blindness and restore sight for more individuals, families and communities.

**Acknowledgements**

The author wishes to thank Operation Eyesight India team, especially Mr. Franklin Daniel, Head of Programmes, who is successfully leading the implementation of the model community eye health programme.

**Table 1** A snapshot of school children covered under Operation Eyesight’s HBCEHP in India

<table>
<thead>
<tr>
<th>Details</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of schools covered</td>
<td>279</td>
<td>261</td>
<td>217</td>
</tr>
<tr>
<td>Number of teachers trained</td>
<td>335</td>
<td>313</td>
<td>97</td>
</tr>
<tr>
<td>Number of children screened</td>
<td>21,647</td>
<td>18,463</td>
<td>15,101</td>
</tr>
<tr>
<td>Number of children prescribed spectacles</td>
<td>414</td>
<td>383</td>
<td>229</td>
</tr>
<tr>
<td>Number of children provided with spectacles</td>
<td>375</td>
<td>349</td>
<td>211</td>
</tr>
<tr>
<td>Number of children identified with other eye diseases (conjunctivitis, other infections, etc.) and referred to a hospital</td>
<td>1,086</td>
<td>1,114</td>
<td>954</td>
</tr>
<tr>
<td>Number of children operated on through the project</td>
<td>71</td>
<td>103</td>
<td>126</td>
</tr>
<tr>
<td>Number of children identified with Vitamin A deficiency during school screening and provided with Vitamin A supplementation</td>
<td>211</td>
<td>76</td>
<td>3</td>
</tr>
<tr>
<td>Number of children who received immunisation as a result of the project</td>
<td>11,665</td>
<td>11,822</td>
<td>37,011</td>
</tr>
</tbody>
</table>

**Children below five years**

| Number of children who received immunisation as a result of the project | 11,665 | 11,822 | 37,011 |

**School-screening programme, India**

School-based eye health programmes are a golden opportunity to recognise that the timely provision of effective interventions can be a life-changing experience for a child in need.

School is the first formal space for learning. Using this space to reach the vast cohort of school-aged children who constitute a particularly vulnerable group because of the high prevalence of refractive error is a common practice. There are several models of school eye health programmes currently operational across India. REACH – Refractive Error Among Children is a model aiming to address challenges in the school eye health space and build innovative, sustainable and scalable programmes.

**The REACH model**

The REACH model employs a three-phased deployment approach.

**Phase I: Prepare**

This phase involves four steps:
- Generate a database of all the schools in the project area.
- Establish initial contact with local authorities, schools and other stakeholders to get their buy-in and necessary permissions.
- Generate a list of enrolled students in each of the participating schools.
- Plan and schedule service delivery activities with an adequate lead time.

This phase sets the foundation for subsequent service delivery activities.

**Phase II: Deliver**

The first activity in this phase is primary screening, where the vision screener confirms the identity of the child. The screener performs a visual acuity assessment using a basic pocket vision screener with LogMAR 0.2 optotypes (Snellen 6/2.5). Children who fail the vision screening test or have any other ocular complaints even in one eye or are already wearing spectacles are selected for secondary evaluation.

- During secondary examination, the team which includes an optometrist or ophthalmologist conducts a detailed visual acuity assessment, refraction and ophthalmic evaluation. All children who require spectacles are given a prescription. Three intervention categories may emerge:
  - Children identified with simple refractive error may receive spectacles on the spot.
  - Complex prescriptions that need custom spectacles are delivered at a later date. Nevertheless, children are also given an opportunity to select their frames.
  - Children who need cycloplegic refraction may receive it on the spot or are referred to the nearest fixed facility. Any child who may need further evaluation or other intervention is also referred to the base hospital or nearest vision centre for necessary investigation and treatment.
  - All children who require spectacles are counselled by a counselor on spectacle care, need for continuous wear of the prescribed spectacles as well as provided information on contacting the concerned person in case of any difficulty, for ensuring acceptance of the dispensed glasses.

In addition to addressing children’s eye health needs, the REACH team also screens all teachers and provides orientation on the basics of primary eye care using Orbis’ ‘Vision Screening Handbook for School Teachers.’

**Phase III: Consolidate**

Often the end-point of school-based programmes is the distribution of spectacles and the entire exercise is a one-off event. It is important to investigate whether children who are given spectacles are using them or not.
In REACH, a team member visits the school unannounced three months after giving glasses to determine compliance and complete a compliance/ non-compliance questionnaire. This approach has provided the teams not only with an opportunity to evaluate the success of the intervention but also a chance to identify specific reasons for compliance/ non-compliance. The team can also identify children whose glasses need repair or replacement in case of minor problems, or breakage of the glasses that were provided earlier.

REACH also has an annual follow-up visit scheduled within the programme. A year later, the same team visits the school to re-evaluate children who underwent a secondary evaluation. New admissions including first grade (elementary), all students in 8th (secondary) and 11th grade (higher secondary) and any students identified by the oriented teachers to have an eye health issue are screened. This visit is planned on an annual basis.

The REACH model is built on four defining features:

**Knowledge Attitude Practice (KAP) study**

A KAP study on refractive errors in children amongst children themselves, their parents, teachers and eye health professionals is conducted. The findings of this study guide the development of appropriate Information Education Communication (IEC) training material as well as other awareness generation activities. This creates a strong mechanism to effectively communicate with stakeholders and empower them with the right information to make them receptive and accept the treatment provided. Evidence of any change in eye health seeking behaviour within the community will be documented through a repeat KAP study in the same area.

**Standardisation**

Standardisation of process, hardware and software all contribute to making REACH a unique initiative. A common guideline has been developed to standardise both clinical and non-clinical processes. All implementing partners are utilising the same guidelines for vision screening cut-off, spectacle prescription, cycloplegia, referral, compliance evaluation and follow-up, among others. Similarly, key pieces of hardware are standardised across sites, e.g. internally illuminated pocket vision screens, auto-refractors, LogMAR visual acuity charts as well as child-friendly occluders. And REACHsoft, a bespoke software, is deployed across all sites to manage data at all points of activity within REACH.

**Data Management**

To facilitate all of the above and provide good quality information to drive future initiatives, there is a strong focus on data management at all levels and at all steps of REACH. To that end, Orbis has developed REACHsoft, a software solution tailored for this programme. REACHsoft is designed to support the planning, implementation and management (including monitoring and evaluation) of the programme. From the first step of scheduling a visit to a school, REACHsoft supports every step of the planning process and implementation: developing the school database, collecting the school-wise student database, scheduling and planning service delivery activities, collecting data at the individual student level during service delivery (primary screening, detailed examination, spectacle prescription and dispensing, referral management, etc.) as well as monitoring progress and generating reports aiding management of the programme.

**Multi-centric research**

While better data management and real-time monitoring facilitates the smooth implementation of the programme, the huge data set which will be developed is intended to be used for multi-centre research. This will in turn provide evidence-based recommendations for improving similar initiatives in the future.

Considering that 80% of what a child learns is visual,1 good vision is critical to a child’s ability to participate in and benefit from educational experiences. School-based eye health programmes are a golden opportunity to recognise that the timely provision of effective interventions can be a life-changing experience for a child in need. Addressing this need across the country is a mammoth challenge but it is imperative that we REACH out to the millions of children across India.

Considering that 80% of what a child learns is visual,1 good vision is critical to a child’s ability to participate in and benefit from educational experiences. School-based eye health programmes are a golden opportunity to recognise that the timely provision of effective interventions can be a life-changing experience for a child in need. Addressing this need across the country is a mammoth challenge but it is imperative that we REACH out to the millions of children across India.

**References**


School eye health in Nepal: A holistic model

The integration of eye health into comprehensive school eye health programmes not only helps to identify children with significant refractive error and associated ocular morbidities but also helps to promote a healthy school environment.

Health including visual health is inextricably linked to school achievement, quality of life and economic productivity.1 The school eye health programme organised by eastern regional eye care programme (ERECP) in the eastern region of Nepal is designed to improve the visual health of pupils, by directly influencing school personnel, families and indirectly influencing other members of the community through schools.

Globally, 19 million children live with visual impairment, and approximately 12 million children have significant refractive error.2 The prevalence of refractive error (0.5 dioptres or more for myopia, 1.00 dioptre or more for hypermetropia and ≥ 0.75 DC for astigmatism) among school going children in eastern part of Nepal was 8.6% and myopia was the most common type (44.79%) of refractive error.3

As per the recently adopted National Eye Health Policy 2017 the school eye health programme needs to develop and strengthen comprehensive eye examination by eye health professionals at the time of school enrollment in Nepal.

The integration of eye health into comprehensive school health programmes not only helps to identify children with significant refractive error and associated ocular morbidities but also helps to promote a healthy school environment. With this, eye health education can reach a large number of children and their families through a child-to-child approach.4

The elements of the school eye health programme are as follows:

1. Primary eye care for early diagnosis and treatment of common eye diseases, management of refractive errors and low vision by providing high quality, appealing and free of cost spectacles and low vision devices.
2. Increasing awareness about healthy school environments amongst children, teachers and community members.
3. Making schools inclusive for children with visual impairment so that they can learn together with normal children.

**Activities include:**

- Eye care teams screen students and staff, provide medical and spectacles at schools, and refer children with complex refractive error and associated ocular morbidities to a base hospital or eye care centre for further evaluation by an ophthalmologist.
- Health promotion and prevention activities on a sustained basis through art by conducting school eye health exhibitions and wall painting.
- Counselling students who received spectacles along with their families and school authorities to ensure they wear spectacles at school and at home.
- Promoting inclusive education for children with disabilities through advocacy for improved accessibility such as ramp, classroom setting for children with visual impairment especially low vision, etc., and also sensitise children, adults and teachers on how to help and interact with children with visual impairment.

**Established models of school screening programme in Nepal**

1. Teacher-oriented approach

A single day’s training was provided to school teachers to identify, refer and enable children with complex refractive errors and associated ocular morbidities for vision screening at a nearby primary eye care centre or base hospital, by giving a referral slip. The referred children had to go through a comprehensive eye examination to receive medical, spectacles and low vision devices free of cost. This approach uses local resources and these resources are based on...
the willingness of trained teachers and support from educational authorities. It requires accuracy of screening in school settings. The main drawback of the programme was the high referral dropout.

2. Eye care team approach

School screenings were done by an eye care team comprising of an optometrist or ophthalmic assistant (OA) and an eye health worker. Eye health workers were responsible for conducting vision screening whereas optometrist or ophthalmic assistants did the screening and retinoscopy of all children irrespective of visual acuity. Referral to an ophthalmologist was done only for children whose best corrected visual acuity (BCVA) in their better eye was less than or equal to 6/9 and had associated ocular morbidities that warrant further evaluation by an ophthalmologist. The instruments used during the screening programme were Snellen chart, ophthalmoscope, retinoscope and a torch light. Even though this approach enhances the accuracy of the programme, questions about tracking children referred to a hospital or eye care centre, and prevention and promotion aspects still remain.

3. Holistic approach

This approach involved eye screening, health education and inclusion.

**School Screening**

Key learnings from the above two approaches led us to reformulate the screening programme using a mixed approach (Figure 1). Screening is done by camp team comprising an optometrist or ophthalmic assistant (OA), eye health worker, optical helper and a pharmacy assistant.

- Eye health worker is responsible for conducting vision screening and eye health exhibitions.
- Optometrist or ophthalmic assistant for screening and retinoscopy of all children irrespective of visual acuity.
- Optical helper for processing and fitting of spectacles and
- Pharmacy assistant for medicine distribution.

The vision screening is followed by comprehensive eye examination, refraction and provision of free medicines and spectacles, provided as per the need at a school site and referring children with complex refractive errors and associated eye conditions to an ophthalmologist. A counselling session was organised for children who obtained spectacles along with their families and school authorities to ensure spectacle wearing in schools and homes. The session also addressed proper seating arrangement in classrooms to ensure attention and participation in class activities.

**Inclusion**

Another unique aspect of the programme, was the activities to promote inclusive education in schools where children with disabilities study. These were advocacy for construction of ramps in schools and ensuring scholarships to children with disabilities. Sensitising important stakeholders in the government for mobilisation of funds to those children as well as providing orientation and training to teachers and school management on inclusive education was also part of this project. The aim of these activities was to sensitise and impart knowledge on inclusive education and create a welcoming learning environment in classrooms which will help in minimising the dropout rates of children with visual impairment.

Though this holistic approach had many positive outcomes one important concern was the long term follow up mechanism. Follow up of children with refractive error and complex eye conditions by field level staffs every three months at schools, will ensure spectacle wearing and minimise the dropouts. This model holds promise in ensuring no child is left behind.

Key factors that contribute to success and sustainability of school eye health programme includes:

- Continuous support and engagement of local education authorities.
- Active participation of parents and care-takers.
- Financial and technical support from public and private agencies.
- Continuous commitment of the eye health workforce.
- Continuous supply of high quality spectacles and low vision devices.

Eye health is an essential part of any school health programme, should be aligned in such a way that services are available and accessible to all children. The school eye health programme should not only focus on correction of refractive errors, but also be comprehensive and holistic in nature.

**School eye health education**

Along with screening, the school eye health awareness programme also included awareness about keeping eyes healthy by eating Vitamin A rich foods every day, attention to personal hygiene by making sure children wash their face daily and encouraging mass awareness through a child-to-child approach. A wall painting “Saag Bahadur- Bhaat Bahadur” (Motivating children to eat Vitamin A rich foods daily) was also displayed at a school site to create awareness regarding eye health.

**References**

School eye health services in Sri Lanka: An innovative way of approaching eye health in children

The country has achieved remarkable progress in health sector domains of the millennium development goals compared to the peers in the South Asian region.

Sri Lanka, historically known as the “Pearl of the Indian Ocean,” is home to a population of 20.27 million in the year 2012 and comprised of 25 districts and nine provinces. Sri Lanka is a lower-middle income country which has transitioned from an agriculture based economy towards a more urbanised economy of industry and service delivery. The country has achieved remarkable progress in health sector domains of the millennium development goals compared to its peers in the South Asian region. Further it has a unique free education and health system, which is one of the.core functions of the government. The high literacy rate (overall 92.6% (Male 93.6% and Female 91.7%)) reflects universal access to free education system in the country. Sri Lanka provides free education, starting from primary school up to the level of post graduate higher education under public sector institutions.

School Medical Inspection (SMI) School children’s well-being is a cornerstone of development of a country. There are 4.14 million school children in 10,162 schools in Sri Lanka. The Government of Sri Lanka spends 2.2% of GDP on education, management of human resources and development of infrastructure, centrally and, school uniforms through local governments. In addition there is a successful sponsorship programme for pupils who come from the families below poverty line. The “School Medical Inspection” (SMI) programme began in Sri Lanka in the year 1918 with the objective of identifying infectious diseases among children. This has been recorded as one of the earliest such programmes, initiated globally. The SMI is a collaboration between the Ministry of Health (MOH) and Ministry of Education (MOE) through the Family Health Bureau. As part of this programme, every child entering the government school system is examined periodically for health conditions, including visual problems.

Structure of the SMI programme
The main cadres involved in SMI are medical officers of health (identified as MOH – a medically qualified and a registered practitioner from the public sector), public health inspectors (PHI) and public health midwives (PHM) in the local government. Based on the size of population, geographical regions have been divided among medical officers of health who work under a regional director of health services (MOH). The MOHs are responsible for conducting SMIs in their assigned areas. In the school based programme, children are examined in grade 1, 4, 7 and 10 by the SMI team. In the conventional programme, visual acuity is checked by a trained Public Health Inspector (PHI). Children who have been identified as having any visual impairment are referred to the nearest hospital with an eye clinic. At the eye clinic, children undergo refraction and prescriptions are given for spectacles. Parents have the choice of buying spectacles of their choice from private stores. It has been observed that the cost of a pair of glasses was unaffordable for most parents, especially those below the poverty line. Often at the end of the SMI process many children ended up not having appropriate vision correction with spectacles. Many limitations were observed in achieving satisfactory screening and spectacle usage under the conventional approach.

Innovative SMI approach under the Vision 2020 programme
Having observed this scenario, the Vision 2020 Programme of the Ministry of Health – Sri Lanka initiated an action plan to correct refractive errors in children. In this programme spectacles are issued free of charge to school children with significant refractive errors. The Vision 2020 initiative has adopted strategies locally to supply good quality spectacles, in bulk, to such children in a cost effective manner, at no cost to their parents. The results have been encouraging. The school eye health initiative is a collaboration between the Ministries of Health and Education and this programme has been successfully replicated using varied sources of non-governmental funds.

Steps followed in the innovative approach were as follows:
1. Initial planning including identification of logistics involved, budgeting, and scheduling.
2. Signing agreements with local stakeholders, meeting regional stakeholders to schedule the project and discuss probable issues and challenges.
3. School teachers’ training: Pre-screening was taught to teachers with practical illustrations in order to make them familiar with identifying children with visual impairment. A batch of approximately 50 school teachers was selected. Each teacher has the capacity to screen up to 500-1,000 children. Trained teachers were assigned to transfer skills gained to the rest of the teachers at their institution. The number of teachers to be trained was decided based on need and if it was inadequate, higher level secondary school prefects were trained.
4. A single optotype E card was introduced to the system in order to make the pre-screening procedure easy and simple. Only a few seconds of time was spent per child for vision screening. This optotype was piloted and validated to prove its accuracy. Teachers were requested to reproduce copies of the card in similar size and quality and share with others. A Vision 2020 toll free telephone number was opened to tackle the queries they have about screening. Teachers were screening children with great success and they were listing children who had impaired vision as they were instructed. In the practical setup, it took less than half a minute to screen a child in contrast to two to three minutes with Snellen chart. Schools with lesser number of children could be screened rapidly and the schools with larger populations could be screened within two weeks.
5. Lists of children who were unable to pass through the vision test were referred to regional health authorities. Later, further examination and refraction were organised in close proximity to the MOH office or school. Mass refraction programmes were organised with participation of several optometrists and prescriptions were issued to children who had significant refractive errors (myopia or myopic astigmatism > -0.50 D sphere or cylinder or hyperopia > +0.75).
6. Children were given the choice of type, design and colour of the spectacle frame. Each child was given the best suited spectacle, which was custom made according to the prescription.
7. Eye glasses were given free of cost to those in need, with funds available from the Vision 2020 Programme of the Ministry of Health. These funds were sourced from different donor organisations. Vision 2020 programme coordinators monitored the production of good quality spectacles at a low cost. The cost of a complete pair of spectacles was around 600 LKR (4 USD), which consisted of a custom made CR 39 lens, metal frame in the desired colour, a plastic box and a cleaning cloth.
8. Selection of suppliers for eye glasses took place annually according to tender procedures and regulations about instrument procurement under the Ministry of Health. A technical evaluation committee, comprised of eye health professionals, decided the minimum specifications of spectacles. Terms and conditions were made and an agreement was signed in order to supply spectacles as per specifications and provision of after sales services with a warranty for defects.

Asela Abeydeera
National Coordinator, Vision 2020 Programme for Prevention of Avoidable Blindness in Sri Lanka

Pupils were given an opportunity to select their favourite spectacle frame, Sri Lanka
9. Once manufactured, spectacles were received at the head office of Vision 2020 in the capital city, a random sample was checked with an automatic lens metre prior to dispatch. The spectacles were securely sent to different regions across the country via local courier services.

10. At the district level, spectacles were handed over to students through the local health and education officials with an instruction sheet to the parents on usage and care of glasses.

11. Trained teachers in each school were assigned to follow up on children who received spectacles. This included periodic checks to see whether they were using them in the correct way and to report back to the health officials with details of follow up.

12. Follow up programmes were organised in each area to replace broken and misplaced glasses and to provide new spectacles to those who needed a change in prescription.

By adapting a conventional programme in the health system and using new innovations to control avoidable blindness, the school eye health programme is a success story in Sri Lanka. This programme illustrates the possibility of achieving complete screening coverage of a targeted population using cost effective interventions. Sri Lanka could screen the entire student population and provide eye care free of charge, by integrating an eye care programme into the existing system through public-private partnerships and a multi-disciplinary approach. Several case studies from the country showed improvements in the quality of life of spectacle recipients, with many regaining better sight. Lessons learned from Sri Lanka could be useful to other neighbouring countries and the rest of the world to develop strategies to control childhood blindness.

**Highlighted of Sri Lanka School Eye Screening Programme:**
- Totally free of cost for school children
- Pre-screened by trained teachers
- Funded by non-governmental organisations
- Total student population covered
- Government mediated, credibility ensured
Impact of colour vision deficiency on children

Most people with colour vision defects develop effective adaptive strategies and behaviours, and they use other clues, such as a colour's saturation, to deal with any potential limitations in their professional and personal lives. Increasing use of colour in education has raised concerns for children with CVD, but robust evidence is lacking.1 Children with CVD may perform poorly on tests or assignments that employ color-coded materials. If the student and their parents are unaware of the issue, those students may struggle in class, leading teachers to group them in the wrong academic track at school. Dr. Varma and other researchers from the Multi-Ethnic Paediatric Eye Disease Study Group tested 4,005 Californian preschool children, aged three to six years, in Los Angeles and Riverside counties for colour blindness. Their findings suggest that successful colour vision deficiency testing can be done starting at age four.2 Prof. Chandak and colleagues recently reported on 850 children aged 10 to 15 years in Wardha district of Maharashtra, India emphasizing the importance of early diagnosis of this dysfunction in children that would enable them to adapt well and better plan for their future, professional lives.3 Cole stressed that school children should know if they have CVD so they can be helped more quickly to find adaptive strategies in the regions with high CVd prevalence, which are currently more inclined towards colour-based learning, the government should make efforts in improving the educational needs of the children, and plan their respective professional futures. It is recommended that, in the context of rapid improvements in the educational needs of the children, the current curricula should be revised to include early diagnosis of this dysfunction in children that would enable them to adapt well and better plan for their future, professional lives.4

Screening of colour vision defects is relatively quick and easy. The Ishihara charts are the most widely used computer-based approaches have been recommended in India among children that help diagnose the type and severity of colour vision deficiency, though there are wide inter-region and inter-distinct variations. In education, UP registered the highest proportion of children aged 6 to 14 years who were out-of-school in 2016. UP also has the lowest school attendance rates of children, at 50-60%.5,6 The percentage of children aged 0-16 years who were out-of-school in 2016.7

Programme strategy

Cluster-based approach

The approach of providing primary eye care at the community level in rural and underserved urban areas is a promising strategy in creating awareness and reducing the burden of avoidable eye diseases.8 The entire project intervention area was clustered into different zones, within which training of teachers and stakeholders, screening of children and provisioning of services were undertaken. This cluster approach helped concentrate work in a systematic manner and optimised the resources available, thereby leading to greater programme efficiency and results.

Integrated primary eye care service approach

The project team consisted of a well-trained paediatric ophthalmologist and a dedicated full-time paediatric optometrist along with others. The team also recruited local anganwadi and ASHA workers to engage with the community. This integrated approach to

a boy being screened as part of this study.
primary child eye health facilitated complete coverage of children enrolled in schools and madrasas as well as those who were out-of-school. Building the capacities of school teachers and community level volunteers like ASHAs, proved to be beneficial in tapping and channeling paediatric patients to avail primary eye care services in local communities. By doing so Mission Roshni envisages improved uptake of eye health services in the region in future.

Counseling for Behavior change
Public health programmes can only deliver benefits if they are able to sustain activities over time. Refractive error is a leading cause of avoidable visual impairment globally, and India is not an exception. Children with refractive errors are prescribed appropriate spectacles which significantly improve their functionality and productivity. However, many studies point to compliance with spectacle use as an issue that is overlooked. One of Mission Roshni's core strategies was to have a dedicated full-time paediatric counsellor in place who would provide regular counselling to children and their immediate family members in order to ensure uptake of vision correction services and improve compliance with spectacle use.

Way forward
Mission Roshni has achieved its desired results. The implementation approaches that were attempted have proven their merit while also showing different ways of working. These approaches can certainly be replicated in other geographic zones. While the deliverables may vary depending on the need of the area, the clustered approach with the help of different stakeholders in the community, coupled with quality service provision is surely the approach that would yield desired and sustained intervention impacts.

Acknowledgements
The authors wish to thank the staff at our partner hospital, Dr. Shroff's Charity Eye and ENT Hospital, New Delhi for their support in planning, designing and implementing the Mission Roshni project in Meerut district in Uttar Pradesh.

References
4. International Institute for Population Sciences (IIPS) and Macro International.http://www.who.int/ visionplays an important role in the learning and development of a child. Globally, 19 million children are, estimated to be visually impaired. A comprehensive eye health programme should include screening in schools, anganwadis (pre-school), use of a key informant approach and household screening to aid in screening and facilitate necessary interventions. The schematic of the programme is shown in Figure 1. School vision screening is one of the major components. In this article, key steps, strategies and challenges encountered in a school screening programme in one administrative block of Krishnapur District in the Indian state of Andhra Pradesh are described.

The process
Step 1: Obtaining necessary approvals
Necessary approvals were obtained from appropriate local government authorities such as the district collector, district education officer and key stakeholders such as mandal education officer, organiser/supervisor, village sarpanch (Head) in case of household screening in the community.

Step 2: Teacher training
After all the due permissions were obtained, school authorities were requested to nominate one teacher from each school. All the nominated teachers were invited for one day training at a central location. The central location was usually the mandal (sub-district) education office or a school. Typically, 25–28 teachers were trained at each session. The content, duration, training materials and delivery methods were standardised and provided by an experienced vision technician. This content included a brief description on the structures and functions of the eye, refractive errors, common eye conditions in children and vision screening procedures to diagnose and correct them.

Our initial research revealed a large variability in diagnostic accuracy among trained teachers compared to Community Eye Health Workers (CEHW). Although having trained teachers will add sustainability to the programmes, attributes required for a teacher to be a consistent screener remain elusive.

For further screening, CEHWs were also trained as there was variability in screening skills of teachers. An optometrist trained in detecting low vision and ophthalmologist were involved in screening children in special schools and schools for the blind.

Teachers’ vision assessment was part of the teachers training programme. Of the 738 teachers screened, 400 (54.2%) were using glasses and 35 (4.7%) were referred for further examination. This assessment helped us in identifying those requiring intervention and who can potentially become an advocate for eye care for children in their respective school as well as in the community.

Step 3: School vision screening
After training, the school authorities were approached for screening. It is sometimes difficult to get access to screen children and to examine referred children. Children who did not attend referral services, were examined by the vision technician at the schools. It took a lot of time and effort to follow up with the school authorities at the school level. Development of a tentative School Eye Health Calendar involving school authorities helped.

In the project area, there is one integrated school for the blind and three schools for intellectually challenged children. Teachers in these schools also helped in managing children while screening. An optometrist and an ophthalmologist trained in paediatric eye care conducted eye examinations and referred the

Table 1 Achievements of Mission Roshni in two years.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children aged 6-16 years screened</td>
<td>12,906</td>
</tr>
<tr>
<td>Out-of-school children aged 6-16 years screened</td>
<td>59,826</td>
</tr>
<tr>
<td>Total number of children aged 0-16 years screened</td>
<td>16,701</td>
</tr>
<tr>
<td>Number of schools and madrasas where screening was completed</td>
<td>89,433</td>
</tr>
<tr>
<td>Number of teachers trained</td>
<td>283</td>
</tr>
<tr>
<td>Number of anganwadi workers (AWW) trained</td>
<td>662</td>
</tr>
<tr>
<td>Children identified with refractive errors</td>
<td>3,161</td>
</tr>
<tr>
<td>Percentage of children identified with refractive errors</td>
<td>3.5%</td>
</tr>
<tr>
<td>Children provided with corrective glasses for refractive errors</td>
<td>3,147</td>
</tr>
<tr>
<td>Children identified with low vision</td>
<td>10</td>
</tr>
<tr>
<td>Children provided with low vision devices</td>
<td>7</td>
</tr>
<tr>
<td>Children identified for surgical treatment</td>
<td>139</td>
</tr>
<tr>
<td>Surgical treatment – Retina</td>
<td>3 (2.2%)</td>
</tr>
<tr>
<td>Surgical treatment – Strabismus</td>
<td>103 (74.1%)</td>
</tr>
<tr>
<td>Surgical treatment – Cataract</td>
<td>22 (15.8%)</td>
</tr>
<tr>
<td>Surgical treatment – Ptosis</td>
<td>5 (3.5%)</td>
</tr>
<tr>
<td>Surgical treatment – Dacryocystorhinostomy (DCR)</td>
<td>1 (0.7%)</td>
</tr>
<tr>
<td>Surgical treatment – Secondary intra-ocular lens (IOL)</td>
<td>1 (0.7%)</td>
</tr>
<tr>
<td>Children provided with free surgical treatment</td>
<td>136</td>
</tr>
<tr>
<td>Number of family members counselled</td>
<td>4,090</td>
</tr>
<tr>
<td>Number of family members re-contacted for follow-up counselling</td>
<td>352</td>
</tr>
<tr>
<td>Number of community meetings held</td>
<td>270</td>
</tr>
</tbody>
</table>

Children’s eye health programmes: Successful strategies and challenges

School eye health programmes provide a unique opportunity to positively influence the health of 700 million children globally. The impact of school eye health (SEH) goes far beyond good vision—it encompasses education, social development and economic productivity.
tertiary centre for further management. Referral uptake from the school for the blind was a challenge inspite of repeated visits. Service uptake from special schools was relatively better.

Step 4: Referral tracking
All the children who either failed the screening test or had any abnormality were referred to a primary eye care centre (vision centre, VC) in the vicinity of the school. A full-time CEHW along with coordinator was assigned for referral follow up. With this system in place, the referral conversion rate was 61%. To improve upon the referral conversion rate, vision technicians went to schools and examined the children including non-cycloplegic refraction, resulting in increased uptake to 90%. Parent meetings were organised at schools for increasing awareness and uptake of spectacles. For those who did not turn up for the meeting, teachers took the responsibility to get spectacles. Those who needed further management were referred to secondary or tertiary centres (TC). Among those referred, 41% utilised the service. However, active intervention in the form of telephone calls to parents and provision of travel cost for those who cannot afford it, improved the uptake to 61%. Considerable time and effort was required to counsel and convince parents and care givers to bring the children to access services.

In schools, where there were more than ten referrals to tertiary centres, the ophthalmologist visited the centre and examined the children. However, as this is not sustainable, a tele-consultation programme is being introduced in schools, thus avoiding travel of the child to tertiary centres.

Step 5: Key informants
As part of the programme, key informants such as Anganwadi teachers and ASHA (Accredited Social Health Activist) workers were asked to inform the CEHW if they suspected any child with visual impairment. The children identified were referred to the vision technician.

Management Information System for school screening
This was developed to track and report the number of children referred and attended. A framework for monitoring the school vision screening programme included:
- Developing and assigning a unique ID system to identify each child in the project.
- Process indicators were developed, which included average screening per CEHW, primary referral conversion rates (conversion at vision centre), secondary referral conversion rate (conversion at secondary and/or tertiary centres) and spectacle uptake on a monthly basis.
- Output indicators included were number of schools covered, children screened and children referred.
- Data collection forms populated by school with a summary report highlighted the response rate.
- Referral register for recording details of children who failed screening tests by CEHW highlighted the service provided.
- Referral conversion details were tracked weekly.
- Structured weekly reporting formats, describing the weekly activity and plan for the next week were developed.

Monitoring and evaluation helped us ensure the quality of screening and review of service uptake. As of date, 2,43,695 children were screened in sub-districts, out of which 11,412 (4.7%) were referred. Among these, 9,546 (84%), children attended the vision centre. Follow up services are ongoing. Data flow of a sub-district is presented in Figure 2.

One of the major issues identified with this programme was the poor uptake of services and additional intervention required to increase the referral uptake. Additional intervention may be an important aspect that has to be considered if the programme has to be replicated sustainably on a large scale.

Barriers
Children who did not turn up for services at the vision centre level and TC level were identified. Parents were contacted by the CEHW. Responses were collected from 61 parents whose children did not attend vision screening and from 22 parents who did not attend a TC. Major barriers identified are lack of time (22%), lack of priority to eye health (18%) and no one to accompany the child (10%).

Way forward
If the programme has to be scaled up and be sustainable, it is essential to identify the right teachers who can help with the initial screening. At the same time, there is a need for a qualified technical team, including a technician and an ophthalmologist, to ensure that the referrals are examined. Awareness of parents and school teachers is also a priority. Once, spectacles are delivered, systems need to be put in place to ensure compliance with spectacles usage. It is also essential to measure the impact of the intervention in terms of change in scholastic performance. Use of technology for data collection like tablet-based applications and cloud storage may help for rapid data collection and real-time monitoring. This could be an important factor for replication to a large scale or to support a nationwide programmes.

Acknowledgements
This project is supported by United States Agency for International Development (USAID), Lions Clubs International Foundation, Sun Pharma and Hyderabad Eye Institute.

References
Test your knowledge and understanding

This page is designed to help you to test your own understanding of the concepts covered in this issue, and to reflect on what you have learnt.

We hope that you will also discuss the questions with your colleagues and other members of the eye care team, perhaps in a journal club. To complete the activities online – and get instant feedback – please visit www.cehjournal.org

Tick ALL that are TRUE

**Question 1** The following children, seen by a school teacher, need referral to an eye trained health worker:
- a. Child with a red eye
- b. Child with convergent squint
- c. Child with 6/18 vision in both eyes
- d. Child with a white pupil in one eye
- e. Child with 6/6 and 6/9 vision

**Question 2** The following are reasons why children may not wear prescribed spectacles:
- a. Too expensive
- b. Do not fit properly
- c. Teased by other children
- d. Parents do not think they are important
- e. Cannot see any better

**Question 3** The following are important indicators to monitor a school screening programme for refractive error:
- a. Total number of children who had their vision screened
- b. Number of children who failed the visual acuity test
- c. Number of children who were refracted
- d. Number of children who had spectacles prescribed
- e. Number of children who are using spectacles 3–6 months after the spectacles were prescribed

**Question 4** School eye health programmes need to:
- a. Have the approval of the ministry of education
- b. Be funded through the sale of children’s spectacles
- c. Be done once for all schools in a district every 5–10 years
- d. Be part of a broader school health programme
- e. Include eye health for teachers

**Answers**

1. a, b, c and d are correct. A white pupil (leukocoria) may be due to a cataract or other serious eye condition. It is unlikely that the child in (e) will need (or wear) spectacles.

2. All are correct.

3. All are correct.

4. **Amblyopia.** Which statements are true?
   - a. Amblyopia may occur in a child with straight eyes
   - b. Amblyopia is more commonly associated with short sight than long sight
   - c. Unilateral cataract may cause amblyopia
   - d. Severe astigmatism can cause bilateral amblyopia
   - e. Unilateral congenital ptosis will not cause amblyopia

**Picture Quiz**

At school screening, an 8-year-old child is found to have presenting visual acuities of 6/6 in the right eye and 6/60 in the left.

Tick ALL that are TRUE

**Question 1** Which of the following conditions may be responsible?
- a. Myopia
- b. Amblyopia
- c. Congenital cataract
- d. Toxoplasmosis
- e. Optic atrophy

**Question 2** What further tests are appropriate in this case?
- a. Refraction
- b. Dilated fundus examination
- c. Corneal topography
- d. Cover test
- e. Ishihara test for colour blindness

**Question 3** Which of the following can be associated with visual impairment in a child?
- a. Prematurity
- b. Family history of squint
- c. Maternal history of rubella infection
- d. Prolonged close work from an early age
- e. Photophobia

**Question 4** Amblyopia. Which statements are true?
- a. Amblyopia may occur in a child with straight eyes
- b. Amblyopia is more commonly associated with short sight than long sight
- c. Unilateral cataract may cause amblyopia
- d. Severe astigmatism can cause bilateral amblyopia
- e. Unilateral congenital ptosis will not cause amblyopia

**Answers**

1. a, b, c and d are correct. A white pupil (leukocoria) may be due to a cataract or other serious eye condition. It is unlikely that the child in (e) will need (or wear) spectacles.

2. All are correct.

3. All are correct.

4. **Amblyopia.** Which statements are true?
   - a. Amblyopia may occur in a child with straight eyes
   - b. Amblyopia is more commonly associated with short sight than long sight
   - c. Unilateral cataract may cause amblyopia
   - d. Severe astigmatism can cause bilateral amblyopia
   - e. Unilateral congenital ptosis will not cause amblyopia
A comprehensive school eye health programme:

- should be integrated into a broader school health programme
- requires a goal that will result in positive change
- must have the engagement of the ministries of health and education
- needs ‘SMART’ objectives for each component of the programme

A key issue in a school eye health programme is that children may not wear their spectacles.

- Parents should understand why a child needs spectacles
- The child’s vision must improve with correction
- The child must feel comfortable wearing spectacles and like the frames
- The spectacles should be affordable
- Teachers should encourage children to wear their glasses

A school eye health programme requires careful planning, with a goal and specific objectives which address:

- school children, with refractive errors and other eye conditions
- teachers, who may themselves have refractive errors or other eye conditions
- eye health education, involving children to can act as ‘agents of change’ in their families and communities