

## Screening and Correcting Refractive Errors in Refugee and Migrant School Children on the Thai - Burma Border

Jerry Vincent<sup>1,2\*</sup> Satja Netek<sup>2,3</sup>, Frank Green<sup>3,4</sup> and Lin Yone<sup>3</sup>

<sup>1</sup>Salus University College of Health Science, USA

<sup>2</sup>International Rescue Committee (at the time of study)

<sup>3</sup>Mae Tao Clinic, <sup>4</sup>KarenAid

\*Corresponding author, e-mail: jvincent@Salus.edu

### Abstract

This study aims to provide basic eye care and refraction for over 50,000 refugee and migrant children on the Thai-Burma border. We conducted vision screenings in schools to find those who have vision problems and provided them with ready-made spectacles as needed. The methods of this study are as follows; teachers conducted vision screenings in all schools in nine refugee camps and all migrant schools in Tak province. Students who passed the criteria required seeing 6/9 with each eye unaided and not seeing 6/9 in either eye while wearing +2.50 lens. Refractions were conducted in all children who failed the screening. Ready-made spectacles (RMS) were provided as needed. Referrals were made for those who needed additional care. The results showed that 55,902 were screened and 2,751 (4.9%) failed the screening. The positive predictive value for this screening to identify those who needed spectacles or referrals was 28.7%. Of the 2,413 examined, 629 (26%) were dispensed ready-made spectacles (RMS), 31 (1.3%) were referred for full correction, 32 (1.3%) had other conditions and 1,721 (71.3%) were found to be normal giving this screening a positive predictive value of 28.7%. Older children failed the vision screening more than younger children ( $p < 0.0000001$ ) and girls failed more than boys ( $p < 0.0000001$ ). 94.1% saw 6/12 or better with the RMS and when 53 children were assessed 6 months after dispensing, 32 (60.4%) were still using the glasses as needed and 21 (39.6%) were not. In conclusion, the teachers were well placed in all schools to carry on vision screenings as needed. Ready made spectacles are useful to correct most of the refractive errors found in these refugee and migrant children and most of the children given spectacles continued to wear them 6 months later.

**Keywords:** refractive error, screening, refugee, migrant, school children, Thai-Burma border

### บทคัดย่อ

วัตถุประสงค์เพื่อช่วยเหลือตรวจตาเบื้องต้นและวัดสายตาให้นักเรียนในศูนย์อพยพ และกลุ่มเด็กต่างด้าว ที่อาศัยอยู่ในแนวชายแดนไทย - พม่า โดยการคัดกรองนักเรียนที่มีปัญหาภาวะสายตาสั้นหรือสายตาสั้นแล้วดำเนินการจ่ายแว่นสายตาชนิดสำเร็จรูปให้ วิธีดำเนินการ ครูในพื้นที่ ดำเนินการคัดกรองนักเรียนในศูนย์อพยพ 9 แห่ง และในศูนย์การเรียนรู้เด็กต่างชาติในจังหวัดตาก นักเรียนที่ผ่านเกณฑ์ ตาแต่ละข้างต้องมองเห็นได้ถึง 6/9 ด้วยตาเปล่าและตาทั้งสองข้างไม่สามารถมองเห็นได้ถึง 6/9 เมื่อสวมแว่นสายตาสายตาขนาด +2.50 การตรวจวัดประกอบแว่น จะทำในรายที่ไม่ผ่านเกณฑ์ และจ่ายแว่นสายตาให้ รายที่ต้องได้รับการดูแลรักษาเพิ่มเติม ส่งต่อไปยังสถานบริการที่มีศักยภาพต่อไป ผลการดำเนินการ คัดกรองนักเรียน 55,902 ราย มี 2,751 (4.9%) ราย ไม่ผ่านเกณฑ์ ค่าทำนายผลบวกของการคัดกรองเป็น 28.7% จำนวนนี้ดำเนินการตรวจวัดประกอบแว่นให้ 2,413 ราย และ 629 (26%) ราย ได้รับแว่นสายตา 31 (1.3%) ราย ส่งต่อไปยังสถานบริการที่มีศักยภาพเพื่อตรวจวัดอย่างละเอียด 32 (1.3%) ราย มีอาการอย่างอื่น และ 1,721 (71.3%) ราย สายตาสปกติ ค่าคาดการณ์ผลบวกของการคัดกรองอยู่ที่ 28.7% เด็กโตไม่ผ่านเกณฑ์สูงกว่าเด็กเล็ก ( $p < 0.0000001$ ) และเด็กผู้หญิงไม่ผ่านเกณฑ์สูงกว่าเด็กผู้ชาย ( $p < 0.0000001$ ) 94.1% มองเห็นได้ 6/12 หรือดีกว่าเมื่อสวมแว่นที่จ่ายให้ การติดตามประเมินผลหลัง 6 เดือน 53 ราย พบว่า 32 (60.4%) ราย ยังคงสวมแว่น และมี 21 (39.6%) ราย ที่ไม่สวม ข้อสรุป/ข้อเสนอแนะ ครูที่ได้รับการอบรมการคัดกรองภาวะสายตาสั้นหรือสายตาสั้นนักเรียน ประจำอยู่โรงเรียนและสามารถดำเนินการคัดกรองนักเรียนได้เมื่อจำเป็น แว่นสายตาสายตาสำเร็จรูปมีประโยชน์ สามารถแก้ไขภาวะสายตาสั้นหรือสายตาสั้นในศูนย์อพยพและกลุ่มเด็กต่างด้าวโดยส่วนใหญ่ และเด็กที่ได้รับแว่นสายตาสายตาสั้นยังคงสวมแว่นแม้ว่า 6 เดือนผ่านไป

**คำสำคัญ:** ภาวะสายตาสั้นหรือสายตาสั้น, การคัดกรอง, ผู้อพยพ, แรงงานข้ามชาติ, นักเรียน, ชายแดนไทย - พม่า

## **1 . I n t r o d u c t i o n**

Vision screening is an important public health tool that allows for rapid identification of those who might have uncorrected refractive error (Murthy GVS, 2000)). This is particularly useful in remote environments or in underserved populations where routine access to eye care is scant.

There are nine refugee camps on the border holding over 140,000 refugee from Burma at the time of this study. Most of these refugees are from the Karen and closely related Karenni Hilltribes, but the camps also include ethnic Burmese, some Muslim and a small number from other minority ethnic groups. The camps stretch from Mae Hong Son in the North down to Ratchaburi Province. In rainy season, access to some of the camps is limited.

All camps are administered by the United Nations High Commissioner for Refugees (UNHCR) who works with the consent of the Royal Thai Government's Ministry of Interior (MOI). Health care in the camps is provided by four international Non-Governmental Organizations (NGOs) working under the auspices of UNHCR. The Border Eye Program, a collaboration between the International Rescue Committee, Mae Tao Clinic, and KarenAid provide basic eye care services in the refugee camps and to nearby migrant workers and villagers.

Over 42,000 children were reported to be registered in schools in the nine refugee camps and over 10,000 children were estimated to be attending migrants schools in Tak province. Prior to 2009, eye care for school aged children in the camps and for the migrant communities was only available sporadically due to lack of resources. With funding from the USAID childhood blindness program fund, the Border Eye Program developed a program to screen the school children, examine those who failed screening and provide basic eyeglasses for those who need them.

## **2 . O b j e c t i v e**

In this study we describe outcomes of a vision screening and simple spectacle dispensing program that serves children in the schools in remote refugee camps and migrant communities along the Thai-Burma Border.

## **3 . M a t e r i a l s a n d M e t h o d s**

We created a reference manual and a one day curriculum to train teachers how to do vision screenings. One or more teachers from each school completed this training. Teachers trained in this course screened all the children presenting in their schools. These vision screenings included two tests: unaided vision acuity screening and a vision acuity assessment while wearing a +2.50 sphere lens.

A hand held chart with 6/9 (20/30) tumbling E optotypes was used for the screening. The students needed to see at least 3 optotypes correctly to pass the vision acuity test. Each eye was tested individually. After the presenting (unaided) acuity testing, +2.50 D sphere lens was placed before the eyes and acuity assessed again, with each eye individually.

In order for a child to pass the vision screening, they must be able to correctly see 6/9 with each individual eye and must not be able to see 6/9 with each eye individually as viewed through a +2.50 D spherical lens.

A team of 2 well-trained eye care workers were assigned to conduct examinations on all school children who failed vision screenings. These examinations included a careful assessment of vision on a full chart, assessment of the external eye via penlight and loupe and subjective refractions with trial lens set.

Ready-made spectacles (RMS) available in 0.50 D steps in a range from +/1.00 D to +/- 4.00 D were provided as needed. Errors between Plano and +/- 1.00 D were ignored. Referrals to optical shops for full correction were made as needed in cases where a RMS was not suitable. Referrals were also made as needed when additional ophthalmological assessment or treatment were needed.

The vision screenings and examinations were conducted one camp or migrant community at a time. In most cases, the eye examinations occurred on the same day as the vision screening. In this fashion, all 86 schools in nine refugee camps and 64 migrant schools in the Tak province area were all screened between 2009-2011.

Both vision screening and examination results were hand recorded on pre-printed forms and were collected and reviewed monthly and summarized in quarterly reports. In the conclusion of the program, all available screening records were entered into a database.

To assess longer term eyeglass wearing compliance, we randomly selected one camp (NuPo) to see if the children who had received eyeglasses as a result of the vision screening were still wearing the eyeglasses or not.

#### **4 . R e s u l t s**

##### Screenings and Examinations

Our records indicated that 55,902 were screened in this program. Of these, 2,751 (4.9%) failed the screening and were referred for examination. Of those who failed the screening, 338 (12.3%) were lost to follow up.

Of the 2,413 who were examined, 629 (26%) were provided with ready-made spectacles (RMS), 31 (1.3%) were referred for full correction spectacles and 32 (1.3%) were found to have other conditions (mostly conjunctivitis) and the remaining 1,721 (71.3%) were found to be normal. The positive predictive value for this screening to identify those who needed spectacles or referrals was 28.7%.

Records for 7,864 (14%) students did not have complete data, thus a total of 48,038 (86%) of the vision screening records were entered into a database and used to conduct additional analysis. From this database, we found that older children failed the vision screening significantly more often than younger children ( $p < 0.0000001$ ) and that girls failed the vision screening significantly more often than boys ( $p < 0.0000001$ ).

Of those provided with RMS, 440 (95.2%) were minus powers and 22 (4.8%) were plus power and 94.1% recipients saw 6/12 or better with the eyeglasses provided.

The +2.50 D test only allowed us to catch 1 of 22 hyperopes that would not have been caught in the VA test.

Individual records were not available, but the referral optical shop in Mae Sot reported most of the referred children had been refracted and lenses fabricated as needed. Most were reported to be high power and/or astigmatic corrections. Most of the "other" eye problems were red eyes, mild cornea scars, and etc.

##### Wearing Compliance Assessment

We assessed wearing compliance of the spectacles we provided by selecting one camp at random (NuPo) and then going to the house of each child who had received eyeglasses to determine how many were still using the RMS as provided.

Of the 64 students who received glasses six months prior, a total of 53 were interviewed giving a participation rate of 81.5%. Of those interviewed, 32 (60.4%) were still using the glasses at the time of the survey and 21 (39.6%) were not. When asked why they were no longer wearing the specs, 8 (15.1%) said the specs did not help their vision, 7 (13.2%) said the spectacles were broken or damaged and 6 (11.3%) said they had lost their spectacles.

#### **6 . D i s c u s s i o n**

Only 28.7% of those who failed the vision screening were found to have refractive error or other problems. Why is it that a lot of children with normal vision fail the vision screening? Most of these children had never seen an eye chart before. In some cases, there were language barriers and as there was no electricity, lighting on the acuity chart was not able to be controlled. Changing the screening criteria from 6/9 to 6/12 would reduce the number of people who fail the screening unnecessarily, but we would rather fail too many than miss some of the children who might have refractive error. The negative predictive value for this screening to identify those who had refractive error or those who needed spectacles could not be identified because repeated refraction in this group was not in our protocol..

We found that the +2.50 lens test did not add much value to the screening process. The +2.50 D test is meant to identify those with hyperopia, but in our screenings and without the plus lens test, we only would have missed 1 of 22 hyperopic corrections. The literature about effectiveness of using a plus lens test in vision screening of school children was little, but in our context, it was not particularly useful.

Girls were found to fail the vision screening more than boys - we have noted similar gender differences in adults in this population. As expected, older children were found to fail the vision screening more than younger children as they grow into myopia. Our rate of those failing screening and those needing refractive error correction were noticeably lower than that of Thai children and other children in the region (Teerawattananon et al., 2014).

About 95% saw 6/12 or better with the ready-made spectacles provided and about 60% were found to still be using the spectacle six months after they were dispensed. Vision outcomes were as expected but we wish the wearing compliance rate would have been better. Our finding that 60% of the children still use the eyeglasses provided 6 months or more later is comparable to other studies of children's wearing compliance (Aldebasi, 2013 and Gogate et al., 2013), In our population, the children's compliance is worse than 74% wearing compliance at 6 months among adult refugees in these camps (Vincent et al., 2010).

We found no blind or children with serious vision impairment, and we found no serious eye pathologies in these vision screenings. We suspect this is because children with very poor vision or blindness are not likely to be sent to school in this environment.

## 7 . C o n c l u s i o n

We screened over 50,000 refugee or migrant school children on the Thai-Burma border.

Of those screened, 4.9% failed and 1.1% of the total screened were given eyeglasses. Ready-made spectacles provided good vision outcomes for most of those who needed correction and most of the children assessed were found to be continuing to wear their spectacles 6 months after dispensing.

Having teachers do the vision screenings in the schools meant that the eye care workers only had to perform 2,751 examinations. Teachers were well placed in all schools to carry on vision screenings as needed. Migrant schools could refer students to Mae Tao clinic as needed and refugee camp schools could refer to the eye clinic found in each camp. There was a lot of variability in how individual schools continued with vision screenings at the conclusion of this program, but overall we continue to find that school children are being referred by teachers to eye clinics in the camps and at Mae Tao.

## 8 . A c k n o w l e d g e m e n t s

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