Operations Research to Assess a New Training Model for Visual Acuity Screening of Children

A2Z/USAID Cycle VI Child Blindness and Eye Health Grants

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Eye Health Program Manager
Helen Keller International - Indonesia
About Helen Keller International

Founded in 1915

Headquarters in New York and offices in 22 countries

**Our mission** is to prevent blindness and reduce malnutrition by bringing simple, proven and cost-effective solutions to the people who need them most.
About Helen Keller International

Reduce malnutrition

Improve the lives of children with disabilities by increasing the capacity of governments to serve children with visual impairments and other special needs

Blindness prevention programs include:

- Cataract Treatment
- Onchocerciasis Control
- Trachoma Control
- Vision Correction/ChildSight®
- Vitamin A Supplementation
- Diabetic Retinopathy Treatment (new)
- Neglected Tropical Diseases (new)
Program Objectives

To improve the vision of junior high school students in poor areas of Jakarta and Surabaya, their teachers and their families

To increase capacity for vision screening among teachers and health care workers

To increase awareness of the importance of correcting refractive error and regular glasses wear in achieving good vision
Program Objectives

To advocate for policy, systems and budgetary commitments on the part of key government stakeholders to support the program in a sustained fashion.

To create a program to provide vision services to the community in a sustainable manner.
Program Activities

Screen ≈ 200,000 adolescent children, 5,000 school teachers in 200 schools or more in Jakarta and Surabaya

Provide free eyeglasses to 40,000 students + 2,500 teachers

Train 900 teachers in RE screening

Target over 1 million indirect beneficiaries through media campaign
Using Teachers to Screen

Screening usually done at health centers (hospitals or community-based) by medical staff (nurse, ophthalmologist)

Training teachers as screeners is a new approach in Indonesia

Quality of screening performed by different screeners (including teachers, health workers, etc.) not known

No standard curriculum for training teachers to do VA tests
Research Program

Objective
To compare screener training models and identify the “preferred” approach for training teachers to screen for visual acuity loss

Location
33 junior high schools
in 5 cities in DKI Jakarta Province
(North Jakarta, South Jakarta, West Jakarta, East Jakarta, Central Jakarta)

Duration: 9 months (Oct 2010 – June 2011)
School Selection and Model Assignment

Randomly assign 33 schools to 2 training models:

**Model A (N=17)**
A maximum of 5 teachers per school
- 1-2 from the School Health Unit (UKS)
- 3-4 selected by the headmaster:
  - Currently assigned to the UKS
  - Classroom teachers or temporary teachers (non-civil servants)

**Model B (N=16)**
15-30 teachers per school—
Prefer classroom and UKS teachers

**Additional criteria:**
Willing to spend 4 hours for participate to the training
Willing to spend 1-2 hours per day to screen the students
Willing to finish VA screening within 2 weeks.
Study Procedures - Training

Process

1. Pre-test
2. Training
3. Post-test
4. Training evaluation (by teachers)
5. Training observation (by monitoring team)

Model A
1 experienced trainer per training session

Model B
1 experienced trainer
1 assistant per training session
Study Procedures- Screening

Student screening (by teachers)

Screening observation (by monitoring team)
Study Procedures - Re-screening

Re-screening
(by Leprindo Academy Students)

Re-screening monitoring
(by monitoring team)
Study Procedures - Refraction

- Refraction (by HKI RE team)
- Glasses selection
- Lens preparation
- Fitting and distribution
Refractive Error Program Protocol

Teacher Training by the Refractionist

Vision Screening of students by trained teacher

**Fail (VA = 6/18)**

- Re-screening by the Refraction Academy student - VA = 6/18
  
  Refraction examination by the Refractionist

  Need eyeglasses
  
  Eyeglasses distribution

  Need referral
  
  Referred to the ophthalmologist

**Pass (VA = 6/12)**

- Re-screening by the Refraction Academy student - VA = 6/12
  
  No need further examination
# Teacher Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Model A (N=91)</th>
<th>Model B (N=384)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>67%</td>
<td>62%</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>42</td>
<td>46</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>2%</td>
<td>6%</td>
</tr>
<tr>
<td>Diploma</td>
<td>8%</td>
<td>12%</td>
</tr>
<tr>
<td>Bachelor degree</td>
<td>82%</td>
<td>77%</td>
</tr>
<tr>
<td>Master degree</td>
<td>8%</td>
<td>4%</td>
</tr>
<tr>
<td>School health unit teachers</td>
<td>18%</td>
<td>6%</td>
</tr>
<tr>
<td>Classroom teachers</td>
<td>56%</td>
<td>59%</td>
</tr>
<tr>
<td>Subject teachers</td>
<td>91%</td>
<td>87%</td>
</tr>
<tr>
<td>Non-teaching staff</td>
<td>21%</td>
<td>17%</td>
</tr>
<tr>
<td>Teaching experience (years)</td>
<td>16.5</td>
<td>20.8</td>
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</tbody>
</table>
## Student Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Model A (N=12318)</th>
<th>Model B (N=11109)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>53%</td>
<td>52%</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>13.4</td>
<td>13.5</td>
</tr>
<tr>
<td>Screening result</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pass</td>
<td>9330 (77%)</td>
<td>8293 (76%)</td>
</tr>
<tr>
<td>Fail</td>
<td>2799 (23%)</td>
<td>2670 (24%)</td>
</tr>
<tr>
<td>Students refracted</td>
<td>2617 (21%)</td>
<td>2253 (20%)</td>
</tr>
<tr>
<td>Recipient of glasses</td>
<td>2094 (80%)</td>
<td>1777 (79%)</td>
</tr>
<tr>
<td>Glasses still in good condition</td>
<td>199 (8%)</td>
<td>167 (7%)</td>
</tr>
<tr>
<td>Normal</td>
<td>309 (12%)</td>
<td>297 (13%)</td>
</tr>
<tr>
<td>Refused</td>
<td>8 (0.3%)</td>
<td>6 (0.3%)</td>
</tr>
<tr>
<td>Referred</td>
<td>7 (0.3%)</td>
<td>6 (0.3%)</td>
</tr>
</tbody>
</table>
# Teacher Knowledge on Visual Acuity Screening

<table>
<thead>
<tr>
<th>Knowledge Area Tested</th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Definition of screening</td>
<td>64</td>
<td>99</td>
<td>44</td>
<td>97</td>
</tr>
<tr>
<td>Definition of visual acuity</td>
<td>15</td>
<td>64</td>
<td>15</td>
<td>62</td>
</tr>
<tr>
<td>Using Snellen Chart</td>
<td>2</td>
<td>50</td>
<td>6</td>
<td>42</td>
</tr>
<tr>
<td>Using near vision test</td>
<td>16</td>
<td>76</td>
<td>14</td>
<td>69</td>
</tr>
<tr>
<td>Distance for visual acuity (6 meters)</td>
<td>39</td>
<td>99</td>
<td>29</td>
<td>97</td>
</tr>
<tr>
<td>Screening procedures</td>
<td>26</td>
<td>78</td>
<td>16</td>
<td>80</td>
</tr>
<tr>
<td>Other screening procedures</td>
<td>36</td>
<td>84</td>
<td>17</td>
<td>71</td>
</tr>
</tbody>
</table>
Training Successful

Training topics were delivered as per training curriculum

Topics were explained in a systematic way

Active discussion between trainers and participants
Assessment of Training Technique

Demonstrations with Snellen Chart were done.

Near distance test was correctly explained and practiced.

Participants received complete training/screening package (Snellen chart, screening form, reading card, commitment letter, training module).
Areas for Improvement

Provide additional demonstrations on how to correctly fill screening forms

More coaching from the trainers on screening practice and recording
Screening Set Up

Screening was conducted in-doors 92%
Adequate lighting 75%
Crowded, noisy room 59%
Screened in a group setting 56%
Most teachers estimated distance based on tile size 70%
Screening Process

Teachers use correct charts for near and distance vision >95%

Majority of teachers received assistance 70%

Record screening result 56%

Guide reading of Snellen Chart 20%

Do not record screening result directly into form 73%
<table>
<thead>
<tr>
<th>Screening result</th>
<th>Screening</th>
<th></th>
<th></th>
<th>Rescreening</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pass</td>
<td>Fail</td>
<td></td>
<td>Pass</td>
<td>Fail</td>
<td></td>
</tr>
<tr>
<td>Full sample (N=23467)</td>
<td>76%</td>
<td>24%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10% sample (N=2356)</td>
<td>75%</td>
<td>25%</td>
<td></td>
<td>78%</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>79%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specificity</td>
<td>91%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Refraction outcomes

### Refraction result (N=4870)

<table>
<thead>
<tr>
<th>Eyeglasses</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never wear glasses</td>
<td>1927</td>
<td>45</td>
</tr>
<tr>
<td>Wearing glasses</td>
<td>1642</td>
<td>39</td>
</tr>
<tr>
<td>Ever wearing glasses</td>
<td>691</td>
<td>16</td>
</tr>
</tbody>
</table>

### Spherical equivalent (Diopter)

-2.00

### Student status in refraction

<table>
<thead>
<tr>
<th>Recipient of glasses</th>
<th>3871</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>606</td>
<td>12</td>
</tr>
<tr>
<td>Glasses still in good condition</td>
<td>366</td>
<td>8</td>
</tr>
<tr>
<td>Refused</td>
<td>14</td>
<td>0.3</td>
</tr>
<tr>
<td>Referred</td>
<td>13</td>
<td>0.3</td>
</tr>
</tbody>
</table>
Use of Research Results

Development of training guidelines for other HKI Refractive Error and pediatric ophthalmology programs in Indonesia

Revision of screening procedures for existing programs
Use of Results for Policy Development

Collaborate with local departments of health (provincial and district) to incorporate eye health and vision screening to the basic health curriculum for school health units.

Involve refraction academy students into school-based and community-based refraction activities to fill in gaps of inadequate human resources (within health system) on refraction.

Advocate for the standardization of VA screening modules and materials developed by government.
Areas for Further Research

Behaviors, barriers and facilitating factors that affect eyeglass wear and compliance with referrals

Effectiveness of using lay-screeners for VA in adolescents
Acknowledgements

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Jakarta Provincial Department of Health
Schools
Headmasters
LEPRINDO Refraction Academy