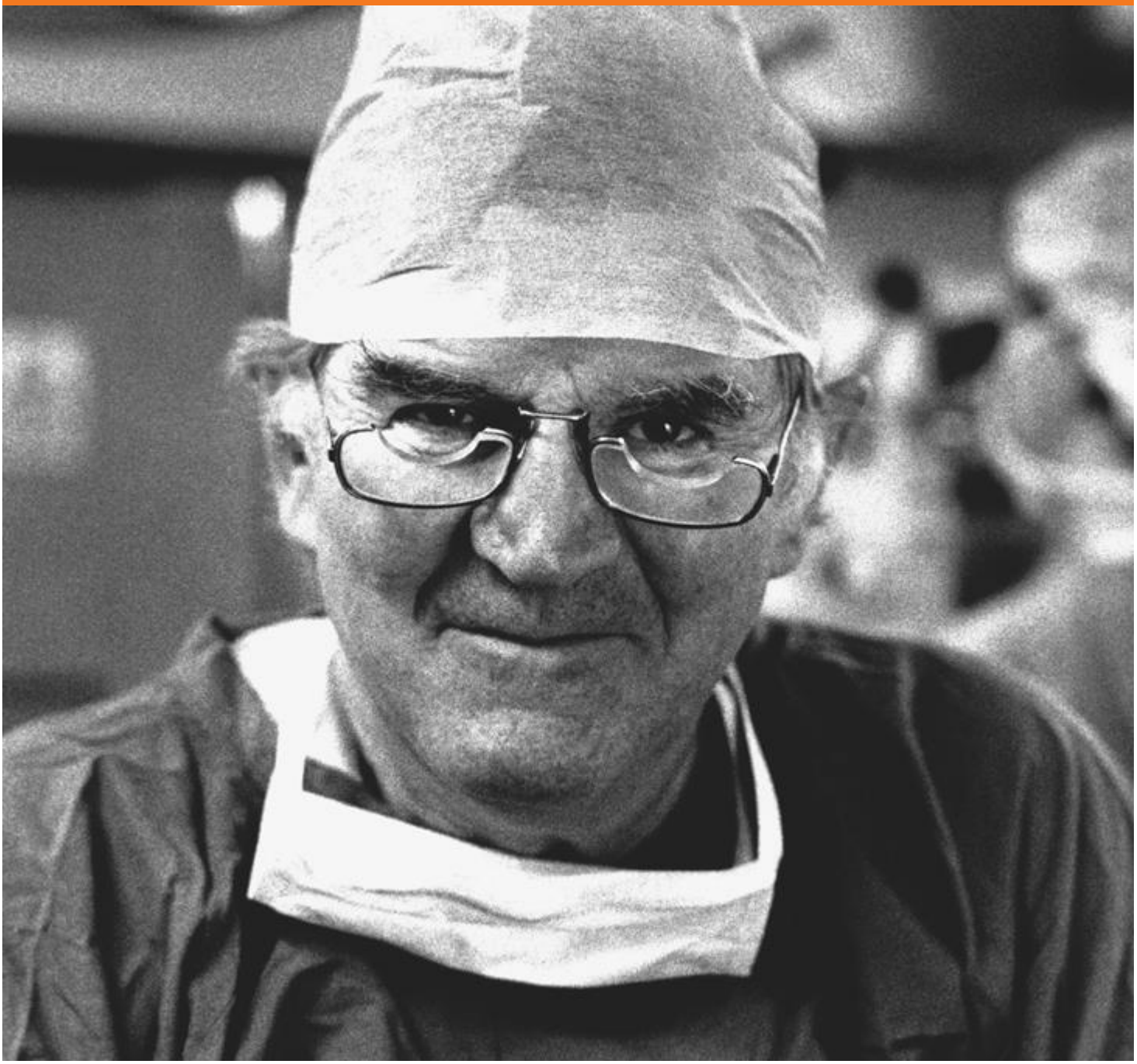
EYE CARE AMONG SCHOOL CHILDREN IN VIETNAM: PREVALENCE OF REFRACTIVE ERRORS, ACCURACY OF SCHOOL-BASED SCREENING, AND KAPS AMONG STUDENTS, PARENTS, AND SCHOOL STAFF

Baseline Survey Report



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Last but not least, the implementation of this project would not have been possible without the contribution of 12 enthusiastic enumerators whose professional experience has helped ensure that our collected data is truthful and always of the highest quality.

Citation

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Abbreviations

BEBE	Better Eyes for Better Education
CI	Confidence interval
CIL	Lower bound of confidence interval
CIU	Upper bound of confidence interval
DEFF	Design effect
KAP	Knowledge, attitudes and practices
MDRI	Mekong Development Research Institute
MoET	Ministry of Education and Training
MoH	Ministry of Health
PPS	Probability Proportional to Size
RE	Refractive error
The Foundation	The Fred Hollows Foundation
VA	Visual acuity
VNCEC	Vietnam Child Eye Care
VNIO	Vietnam National Institute of Ophthalmology

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Key Messages

Mekong Development Research Institute, July 2017

- The proportion of students with untreated eye problems and that of students with uncorrected refractive error are currently quite high (at respectively 18.52% and 24.64%), especially in urban areas in Da Nang and Hai Duong provinces.
- The accuracy of the visual acuity screenings performed by teachers and school nurses in the project's target area is demonstrated by a sensitivity of 60.92% and a specificity of 93.76%. This result is lower than that of some previous studies conducted in Viet Nam and in other Asian countries.
- With regards to students and parents, refractive errors have not been fully understood and their eye care practice needs improving, although these stakeholders have had some understanding of myopia and a large proportion have known how to correct this error.
- Teachers and nurses are reported to have possessed much better knowledge than students and parents, with decent eye care practice; however, their understanding is incomplete and minor misperceptions persist.
- Students, teachers and nurses generally have good attitude towards glasses wearing and people who wear glasses; nonetheless, there is a trend of negative attitude among the parents when it comes to these issues.
- Spectacles are not yet well-integrated in the stakeholders' life and compliance with glasses wearing remains an issue.
- Differences between male and female are modest across the whole sample, apart from the observation in lower-secondary schools, where female students have slightly stronger performance in terms of knowledge on eye care than male students.
- Rural students have weaker performance in knowledge on eye health than urban students.
- Different parties access information from different channels, as students have access to information regarding eye care mainly at school, but the parents tend to get information from the media and people around them.
- Notable differences are observed in terms of the factors affecting students' knowledge between primary and lower-secondary schools.

Project Summary

The preliminary research stage is aimed at collecting data on:

- The possibility of teachers in performing visual acuity screenings for school students, and prevalence of refractive error in targeted provinces.
- Knowledge, attitude and practice among school students, parents, teachers and school nurses toward refractive error and eye care; and

Suggested Citation

Mekong Development Research Institute. Eye health among school children in Vietnam: Prevalence of RE, accuracy of school-based screening, and KAPs among students, parents, and school staff. A Fred Hollows Foundation Research Report. July 2017.

Eye health among school children in Vietnam: Prevalence of Refractive Error, accuracy of school-based screening, and KAPs among students, parents, and school staff

Executive Summary

Prepared by the Mekong Development Research Institute, July 2017

BACKGROUND

The proportion of school students with refractive error is on the rise while the knowledge, attitude and practice (KAP) of eye care among parents, teachers and school health staff for school students remain limited, and information about this situation is lacking in Viet Nam. Besides, the School Eye Health projects initiated by The Fred Hollows Foundation in Viet Nam for the three target provinces of Hai Duong, Da Nang and Tien Giang (2016-2019) aim at strengthening the knowledge, attitude and practice of all related stakeholders to child eye care.

The preliminary research stage of the project aims at providing empirical evidence on actual knowledge, attitude and practice of eye care for school students among related stakeholders, as well as evaluating the skills of teachers in performing screenings on visual acuity among school students. Furthermore, both the preliminary and final research stages will provide insights about the impacts of the project, which will then form the basis for the School Eye Health projects in adjusting further its long-term vision laid down for other similar eye care programs dedicated to school students in Viet Nam.

Aims and Questions of Study

This study will carry on analyses of collected data aimed at answering the following research questions:

1. What is the accuracy of refractive errors screening performed by school staff?
2. What proportion of boys and girls in primary/lower-secondary schools have refractive error?
3. What proportion of children in primary/lower-secondary schools have uncorrected refractive error?
4. What are the knowledge, attitudes and practices (KAP) of boys and girls, their parents and school staff regarding eye health and eye health services?
5. Are there associations between key KAPs and key socio-demographic characteristics of students, parents, school or teachers?

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METHODS

Study Design

The study has four components:

- Visual acuity (VA) screening performed by school staff;
- VA screening by ophthalmologists randomly on 25% of those screened by school staff;
- Quantitative survey; and
- Qualitative interviews.

Participants

The survey team coordinated with the School Eye Health Project's Management Board in the three provinces to contact the selected schools for the survey.

In the target provinces of Hai Duong, Da Nang and Tien Giang, the study was done over a sample of 3,568 school students to be screened on visual acuity by school staff, and 1,040 pairs of school students and parents interviewed in 15 primary schools and 11 lower-secondary schools.

In the non-target area within Da Nang, 1,270 students were screened and 360 pairs of school students and parents were interviewed in 5 primary schools and 4 lower-secondary schools.

The total number of school students rechecked over visual acuity by doctors in 35 schools within both target and non-target areas stand at 1,404 children.

Besides, the study has conducted interviews with a total 140 teachers and 35 school nurses in all schools.

Procedures

The procedure for the field work was planned as follows: training for enumerators, training on VA screening for school staff and consecutive implementation of VA screening for students conducted by school staff, quantitative and qualitative interviews and ophthalmologist's follow-up examination.

Data Synthesis and Analysis

The qualitative data is coded and analysed in NVivo 11. The quantitative data is kept as encrypted data and submitted to a server to by enumerators every time an interview is completed. Assigned experts of MDRI on data management and analysis have already cleaned, labelled and analysed the data in Stata 14. Each participating subject is labelled by a unique identification code, so that data for school students, parents and teachers can be easily merged.

Ethical Approval

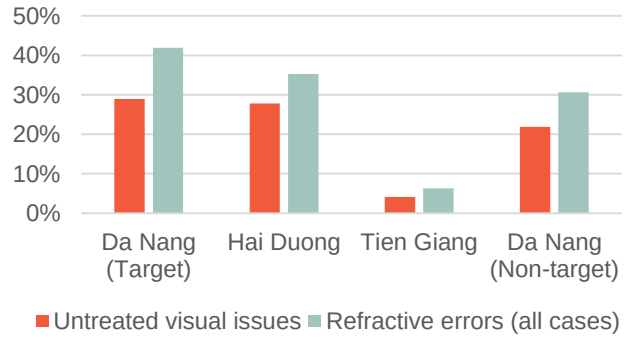
In January 2017, a formal ethical approval was granted for the project by the Ethical Review Board of Hanoi Medical University (Ref No. 57/HDDDDHYHN). The research team has sent a document containing detailed information about the project and letters of permission to be signed by parents of the children to be interviewed and screened. Only those with their parents' consent could participate in the study.

RESULTS & DISCUSSION

Visual Acuity Screening Results

There are on average one sixth of students with untreated vision problems in the target area (18.52%), with a significantly smaller number in Tien Giang (4.49%).

One fourth of students have RE (including all cases, regardless corrected or not), however this proportion is lowered down by Tien Giang (only 6.42%).



Additionally, the prevalence of untreated RE is significantly higher in urban areas compared to rural ones and in lower-secondary schools compared to primary ones. There is, however, no differences between male and female in terms of the prevalence of visual issues and RE.

On average, among all provinces and areas, two in every three school children with RE have not received appropriate correction.

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Accuracy of VA Screening

The results of the screening performed by school staffs reveal lower levels of accuracy compared to previous studies done in Viet Nam and other parts of the world, partly due to differences in applied methodology, research subjects and preparation.

In the target areas, the level of accuracy demonstrated by school teachers reached a sensitivity level of 60.92%, meaning that 60.92% of students with visions below 7/10 or abnormalities in either one or both eyes were identified by the teachers during screening. Meanwhile, a specificity level of 93.76% means that school staff correctly identified 93.76% of students who had no vision problems.

In non-target areas within Da Nang province, better levels of specificity and sensitivity, and positive and negative predictive values show that the level of coverage of correct referrals is higher, which might be a result of better training and preparation.

School staff at urban schools performed worse than their colleagues at rural schools, most likely because the larger proportion of students with RE in urban areas and the time constraints faced by school staff during screening activities.

Knowledge, Attitudes & Practices

The KAP of students, parents and school staff relating to RE and eye health is quite modest, though school staff performed moderately better.

Students' and parents' knowledge is concentrated around myopia while school staff's knowledge is more balanced, though astigmatism is lesser-known. In fact, other RE symptoms than blurred vision, such as fatigue and headache, are widely unknown leading to an understatement of RE issues.

Besides, half of the students have never been eye-checked because their parents considered they can see clearly. Incorrect practices towards eye care are also common. Especially among students and parents, hygienic preventive methods are broadly undervalued.

Regarding glasses, they are not yet well integrated in stakeholders' lives; parents have the most negative attitude towards them. A large proportion of parents do not believe in their efficiency, thinking it is unnecessary or inconvenient. Less than 55% of students with RE wear glasses either always or frequently.

Students, teachers and school nurses generally have good attitude toward spectacle wearing, however that of parents needs improving.

Implications for programming and advocacy

- The capacity of school nurses and teachers in identifying low vision and conducting screening for early diagnosis of refractive errors among students should be strengthened. Urban schools should have more teachers trained with visual acuity screening and should also be allocated extra time for this practice.
- It is necessary to integrate the screening program and early detection of refractive errors conducted by teachers and school nurses into regular school activities.
- Knowledge dissemination activities about eye care in schools should be increased. Parents should however be approached more through the mass media.
- Knowledge dissemination activities about astigmatism and other eye care practices, such as outdoor activities and nutritional provision should be increased; semi-annual eye checks should be encouraged.
- The School Eye Health projects should develop a list of misconceptions related to preventions and adjustments for refractive errors and explain them thoroughly to parents, students and teachers.
- Teaching materials on knowledge, attitudes and practices regarding refractive error and eye care should be integrated in life skills lessons of the study curriculum. At the same time, instructional materials should be suited for the student's age and grade level to achieve the best results. For primary schools, there should be at least two textbooks for students in the upper and lower classes. For lower-secondary schools, a document could be shared across all the grades.

The mainstream source of information for stakeholders about eye care, diseases and prevention is the TV, however school, especially assemblies and posters, plays a key role for students, while the parents tend to

get information from the mass media as well as their friends and relatives.

In Tien Giang, and in rural areas, students performed on average worse, suggesting that additional efforts should be done in these provinces and areas. No significant differences exist between male and female.

Factors Affecting Student's Knowledge

The three most important factors associated with knowledge on eye health of primary students are their ability to recall information from The Foundation's communication materials, their age, and the knowledge of their parents on eye health. For lower-secondary students, the major determinants affecting their knowledge score are the gender of students, ability to recall information from The Foundation's communication materials, students' attitudes on glass wearing, knowledge of parent and education of parent, gender of teacher, and class size.

Limitations

This study has three limitations:

- First, permission has not been granted by parents for the use of eye dilating drops on the children. This has made this study unable to analyse in more detailed indicators for various forms of refractive errors.
- Second, visual acuity screenings performed by school staff and doctors take place in separate days for most schools. This may lead to inconsistencies in the evaluation of students' eye visions between two days of screening, especially when the eyes of children possess great adjustment capacity during school age.
- Third, because the School Eye Health projects have already implemented several dissemination campaigns about refractive error and eye care, and organized eye check sessions in a number of target schools prior to the preliminary research on knowledge, attitude and practices, the preliminary research results may contain errors and overestimate the findings on knowledge, attitudes and practices of students.

Photo courtesy of the Fred Hollows Foundation in Vietnam

SUGGESTED CITATION

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I.BACKGROUND

1.1. The Economic, Social and Political Context

Vietnam's National Prevention of Blindness Strategic Plan (2015-2020) identifies refractive errors (RE) and childhood blindness as among key areas to be addressed to reduce the burden of avoidable blindness throughout the country. Within this Strategic Plan, specific policies and interventions to address childhood blindness prevention include: screening for RE among children aged 6-15; human resource development in RE through training centres and joint advocacy initiatives. However, eye health is not yet officially included in the school health curriculum. Besides, there is the lack of guidelines for implementing vision screening for students during annual school health checks. Additionally, there exists the shortcomings in the eye health awareness among students and teachers, as well as the lack of resources and training opportunities for school nurses and teachers to provide eye care and appropriate referrals.

1.2. The Fred Hollows Foundation in Vietnam

The Fred Hollows Foundation (The Foundation) is a developmental organization, globally based in more than 25 countries, with the strategic aim of strengthening eye health systems, and the treatment and prevention of avoidable blindness. Aligned with Vietnam's Strategic Plan, The Foundation established the Vietnam Child Eye Care (VNCEC 2016-2018) and Better Eyes for Better Education (BEBE 2016-2019) projects (both are commonly called "School Eye Health"). These two projects are piloted in three provinces Hai Duong, Da Nang and Tien Giang given these provinces are well equipped with eye health infrastructure and human resources by previous works of international non-governmental organisations.

VNCEC aims to support the adoption of School Eye Health guideline/policies at the national level to achieve the sustainable reduction of visual impairment in schoolchildren in Vietnam. This project's activities range from strengthening capacity for school staff, supplying equipment to related parties, providing free or subsidised eyeglasses, developing referral pathway to enable access to eye care for children, monitoring and evaluation, and research, to raising community awareness. VNCEC maintains strong cooperation with the Ministry of Health (MoH) and the Ministry of Education and Training (MoET) of Vietnam in its implementation of project activities.

While VNCEC focuses on enhancing capacity and improving infrastructure, BEBE targets to encourage healthy eye practices and behaviour among schoolchildren in Vietnam through education. Training curriculum for teachers will be developed and piloted in the same areas where VNCEC takes place. The curriculum will be applied on a national scale in all primary and lower-secondary schools (grades 1-9) in Vietnam if the project yields good outcomes.

1.3. Relevant Evidence in the Literature

Literature review of visual acuity screening practice

School-based visual acuity screening programs can help identify students with possible visual impairments, inform their parents of their status and the need for further examination and other conditions to assist students with visual impairments. Several developing countries have undertaken such studies on RE screening to determine the level of suitability of the programs in the school system as different countries have different infrastructure, systems and methods (Teerawattananon et al., 2014). As the VNCEC project is targeting to reduce visual issues, including RE, among schoolchildren in Vietnam, it is critical that Vietnam has a similar study on school RE screening, which should focus on both primary and lower-secondary schoolchildren. This part aims to review RE screening practices of other programs in the world, especially developing countries and key issues to be noted in carrying out such programs.

Firstly, the cut-off points or a threshold for RE screening adopted may affect the cost and effectiveness of RE screening activities. Murthy (2000) suggests that it is possible to use the <6/12 (equivalent to 5/10) in the better eye threshold to increase the cost effectiveness of the school program. A visual acuity testing study in Thailand also used the cut-off point of less than 20/40 (equivalent to 5/10) in either eye to be referred to the local hospital (Teerawattananon et al., 2014). However, a similar study in Brazil used the visual acuity threshold of 0.7 (equivalent to 7/10) (Gianni et al, 2004). Gianni et al argues that decreasing the cut-off point would lead to higher number of false negatives, which are the main cases to be avoided, and increasing the cut-off might lead to a larger number of false positive cases, which may affect the cost of the program. Furthermore, the level of cut-off also affects the compliance of a student referred to an ophthalmic assistant for refraction correction in the long-term. Despite the set cut-off level, there is possibility of high incidence of false-positive outcomes (students without RE referred for further examination) due to the insecurity of school staff (Gianni et al, 2004).

Secondly, the level of accuracy of the screenings conducted by school staff varies sharply in previous studies in the literature. In studies in Asian countries which adopted the 5/10 (or equivalent) cut-off point, the level of sensitivity, which demonstrates the proportion of correctly identified positive cases among actual positive cases, could be as high as 93.5% in China (Sharma et al., 2008) and as low as 59.0% (Teerawattananon et al., 2014) in Thailand. However, it can be noticed that there are few studies that examined the accuracy of RE screenings conducted on primary school students, and the studies involving these subjects tend to feature lower rates of accuracy, such as those done by Teerawattananon et al. (2014) and OstadiMoghaddam et al. (2012). The only published study in Vietnam on the accuracy of school staff's RE screening activities was implemented in Vung Tau (Paudel et al., 2014), with a sample size of 555 students during the age of 12 to 15 years old. This study presents a relatively high level of accuracy, at 86.7% sensitivity and 95.7% specificity, however without the participation of primary school students.

Lastly, external factors such as parents' co-operation and training of school staff can have impacts on the implementation and effectiveness of such RE screening activities in school. In the study by Teerawattananon et al (2014) in Thailand, only 470 out of 624 students who were referred to ophthalmologists at provincial hospitals actually went there because of not obtaining consent from their parents or they did not show up. In addition, the training for teacher is critical in enhancing the quality of RE screening and at the same time, teachers in Thailand did find their willingness to conduct the activity for students although an extra payment can encourage rapid and willing screening.

Literature review of the prevalence of RE in Vietnam

There are only a few studies on the prevalence of RE in Vietnam, which mostly focus on adults and students in secondary schools in specific areas. In Ho Chi Minh City in 2009, Le Thi Thanh Xuyen et al. (2009) reported a very high rate of RE of 39.4%, mostly consisting of myopia, among students in lower and upper-secondary schools. The authors also noticed a significantly higher prevalence of RE in urban areas compared with urban ones. In Ha Noi, in the same year, the rate of myopia was 33.7% (Vu Thi Thanh et al., 2009). Significantly, this rate rose to as high as 40.0% the urban area. In Vung Tau, Paudel et al. (2014) observed that the rate of RE was 21.5% on average, and 27.5% in urban areas. There is, however, a lack of studies that measure the prevalence of RE in other provinces, and especially among younger schoolchildren, including those in primary schools.

Literature review on knowledge, attitudes and practices

Internationally, there has been a relatively large number of studies conducted on the knowledge, attitudes and practices (KAPs) of the public towards different aspects of eye health and ocular care, with some studies specially focusing on glasses wear. Agarwal and Dhoble (2013) carried out a study on the KAPs relating to refractive error among students in rural central India and found that nutritional deficiency, bad eye care and hereditary are believed to be the reasons for low vision. Strikingly, a very high proportion of respondents had the notion that spectacles can harm the eyes. This finding is similar to that of a research in Nigeria (Ebeigbe, Kio & Okafor 2013) in which a large proportion of research subjects had negative thoughts towards spectacle wear.

The role of related stakeholders, such as teachers, parents and the community in general is also an important factor determining child eye health and the effectiveness of child eye care programs. Several studies in the literature on the knowledge and practices of these stakeholders reach a consensus that their awareness is at a low level. A study in Sudan (Alrasheed, Naidoo & Clarke-Farr 2016) raised an important point about the parents looking for alternative traditional treatment for their children's eye problems instead of following the advice of ophthalmologists. In Vietnam, a research on the KAPs of students, parents and teachers about refractive error found that the KAPs of these parties were poor, although teachers had slightly better knowledge than others. One remarkable finding of this research is that the proportion of students who had "good attitude and practices" is 0%, with the majority classified as "average" (Le Thi Thanh Xuyen et al. 2009).

While studies look at the KAPs of the community, they do not explore the link between the KAPs of parents, other parties and those of the children. However, in a survey in Cambodia, relatives and family members are reported as the most popular source of information related to eye issues (Takeo Eye Hospital 2011). In Vietnam, three most popular sources are surrounding people, teachers and the mass media (Le Thi Thanh Xuyen et al. 2009). Nevertheless, how these parties affect children's eye health deserves further analysis.

1.4. Rationale for the Study

From the above literature review, it has pointed out that there is currently a lack of studies in Vietnam on the feasibility of school-based screenings for RE. The prevalence of RE in provinces other than major cities, and the knowledge, attitudes and practices of stakeholders related to schoolchildren's eye care are unknown. There is an urgent need to address these gaps in the literature, especially in the context of Hai Duong, Da Nang and Tien Giang, given the fact that VNCEC and BEBE are being implemented in these provinces. The results of the study will serve as an input for the design of school eye health activities. In addition, the baseline will collect indicators on KAP, which are the input for project impact evaluation at the end of project. This study would ultimately provide the rationale to inform the development of programmatic approaches and advocacy efforts.

1.5. Aims and Objectives

The study comprises two survey phases. A survey has been conducted at the baseline (February 2017) and a similar end-line survey will be implemented in February 2018.

The ultimate aims of this baseline study are:

(i) To investigate the current knowledge, attitudes and practices of boys and girls, their parents and school staff in relation to child eye health and eye care services;
(ii) To investigate the feasibility of school-based screenings for RE and visual issues;

This baseline study's objectives are:

(i) To describe the accuracy of visual acuity screening practices of school staff as well as the prevalence of RE among students in selected provinces;
(ii) To describe the KAPs among boys and girls, their parents, and school staff regarding to eye health and local eye health services;

1.6. The Study Questions

This baseline study seeks to answer five questions:

(i) What is the accuracy of RE screening performed by school staff?
(ii) What proportion of boys and girls in primary/lower-secondary schools have refractive error?
(iii) What proportion of children in primary/lower-secondary schools have uncorrected refractive error?

(iv) What are the KAPs of boys and girls, their parents and school staff regarding eye health and eye health services?

(v) Are there associations between key KAPs and key socio-demographic characteristics of students, parents, school or teachers?

II. METHODS

This study employs a non-randomized controlled before-and-after study design. Described below, is the methodology for the collection and analysis of baseline data.

2.1. Study Design

The baseline study covers four main components:

1. Visual acuity (VA) screening performed by teachers and school nurses (commonly referred to as school staff);
2. Follow-up RE screening performed by ophthalmologists;
3. Quantitative survey of parents, students, school staff; and
4. Qualitative interviews of parents, students, and school staff

The flow chart describing the design of this baseline study in Appendix 2 provides more details about the activities in each component.

2.2. Study Setting

As the VNCEC and BEBE projects are delivered in Hai Duong, Da Nang and Tien Giang, these three provinces were chosen for the study by The Foundation. The Foundation provided a list of schools participating in the projects, and a list of schools in the non-target area in Da Nang to MDRI. Based on this list, MDRI's sampling experts chose 26 schools in the target area of the projects, and 9 schools in the non-target area for the study.

As the ratio of the number of students in primary schools and lower-secondary schools participating in the project's area was around 1.2, school selection was done using the Probability Proportional to Size (PPS) approach, with the target of maintaining this ratio of students. Under this sampling approach, the schools with larger number of students were more likely to be chosen in the sample. The final number of schools chosen in the target area was 9 schools in Da Nang (comprising 5 primary schools), 9 schools in Tien Giang (comprising 6 primary schools), and 8 schools in Hai Duong (comprising 4 primary schools). In the non-target area in Da Nang, 9 schools were chosen, among which 5 were at the primary level.

2.3. Participants and Recruitment

There are four categories of participants taking part in the activities of the baseline study including students, student's parents, teachers and school nurses.

With regards to VA screening by school staff and ophthalmologists, initially, students in all grades were selected to participate in this activity; however, during the first day of the fieldwork, The Foundation and MDRI realised that VA screening using alphabetical visual charts was not suitable for grade 1 students. Therefore, officially, only those from grade 2 to grade 9 took part in this part of the study.

When it comes to quantitative interviews, only students at grade 3, 4, 6 and 7 were involved since they were considered by the research team as being mature enough to respond to interview questions, and can be tracked in the end-line study in 2018. One parent or guardian of each student was also invited for interview. In addition to conducting VA screenings, school staff, including homeroom teachers and a

school nurse and/or a youth union staff member, were also interviewed using the quantitative questionnaire.

Finally, the qualitative interviews involved some students with experience with RE, their parents as well as their teachers.

Recruitment Approach

To ensure the representativeness of the survey, the multistage stratified sampling, Probability Proportional to Size sampling and random sampling techniques were used to select the sample. At first, the Probability Proportional to Size approach was used to select 26 target schools and 9 non-target schools, as discussed above in the Study Setting section. After the list of all classes and all students in selected school was available, the random sampling technique was used to identify one class per grade in each school, and all students from the selected class were chosen to participate in VA assessment. Among the students screened by school staff, 25% of them were randomly chosen to take part in a follow-up RE screening performed by ophthalmologists.

In each school, among those at grade 3, 4, 6 and 7 who were chosen to be screened by school staff, approximate 20 students per grade were randomly selected for quantitative interviews. The parents of these children were identified and contacted for the quantitative survey. After an official list of students was identified, the reserve list of students was also randomly selected so that replacements could take place if the students on the official list could not attend the quantitative interview.

Homeroom teachers were selected from the list of classes of each school. The homeroom teachers of those classes were invited to participate in the quantitative interview. In addition, they also joined focus group discussions in the qualitative survey. It should be noted that all of the above steps of the sampling procedure were programmed using Stata 14.

Sample Size

The sample size was estimated separately for the two groups: target and non-target.

The sample size for the student quantitative survey in the target area was calculated using the formula for estimating a single population proportion:

$$N = \frac{Z^2.p.(1-p)}{e^2}$$

where:

- N = required sample size
- Z = value of z statistic at 95% confidence level = 1.96
- P = estimated proportion of school children with RE = 50%
- e = maximum confidence interval = +/-5%

$$N = \frac{1.96^2.0.5.(1-0.5)}{0.05^2} = 384$$

In addition, considering the design effect (DEFF) was 2.5 and estimated non-response rate was 10%, the sample size for this baseline quantitative survey in target provinces was determined as: 384 x 2.5 x 110% = 1,056 students.

Since the standard class size set by the Ministry of Education and Training of Vietnam was 35 students per class and from the average number of students per class in the three provinces (approximately 40 students per class), the research team proposed a fix sample of 40 students per school for the quantitative interview. Therefore, the number of schools for the survey in target provinces is 26 schools (1,056 divided by 40). Using a similar approach, 360 students were selected from 9 non-target schools to take part in the quantitative baseline survey.

The sample size of the baseline survey upon the completion of the survey is presented in Table 2.3.1 below.

Table 2.3.1. Sample size of baseline survey for VA screening by school staff, RE screening by doctors, and quantitative survey

	No. of students in visual acuity screening		No. of participants in quantitative survey		
Location	**By teacher**	**By doctors**	**Student**	**Parent**	**School staff**
Non-target (Da Nang)	1,270	321	360	360	45
Target	3,568	1,083	1,040	1,040	130
Hai Duong	1,026	302	320	320	40
Da Nang	1,347	421	361	361	45
Tien Giang	1,195	360	359	359	45
Total sample size	4,838	1,404	1,400	1,400	175

2.4. Data Collection

Materials

There is a variety of materials used in the baseline study to collect the data. Each component has its unique material and technique. The following table (2.4.1) presents the set of materials for each component accordingly.

Table 2.4.1. Table of materials and tools for data collection in the baseline study

Component	Materials	Note
VA screening by school staff	Training documents for nurses and other school staff on knowledge of RE and VA assessment procedure (Alphabetical) Visual chart Hard tape for measuring distance Template to record VA screening result	Refer to the supporting documents – VA screening guideline
Follow-up RE screening by ophthalmologists	(Alphabetical) Visual chart Pinhole glasses and lens kit with trial lens set Autorefractometer Ophthalmoscope, retinoscope Jackson Crossed Cylinder Auto lensmeter Dilating eye drops Template to record RE screening result	This is the initial list of equipment. During the implementation, due to the parents not approving the use of dilating eye drops, the ophthalmologists just screened for low VA and eye diseases and therefore utilised fewer materials. This will be discussed in more details in the next section.
Quantitative interview	Field survey manual Tablet PC with pre-installed survey software Student questionnaire Parent questionnaire Teacher questionnaire School nurse questionnaire	Refer to the supporting documents – Quantitative questionnaires
Qualitative interview	In-depth interview questions for students In-depth interview questions for parents Focus group discussion questions for students Focus group discussion questions for parents Focus group discussion questions for teachers Recorders A0 papers for note-taking and demonstration	Refer to the supporting documents – Questions for qualitative interviews

Procedures

Field pilot

Upon the official implementation of the field work, survey protocols were piloted in Hai Duong in December 2016. The schools chosen for the pilot were Lai Cach 1 Primary School and Cam Dinh Secondary School in Cam Giang district. The Foundation recommended these schools for the pilot test, as they are in Hai Duong – a targeted province of the projects, and therefore could cooperate easily with the research team.

In Lai Cach 1 Primary School, the research team interviewed one student in each grade (from 1 to 5), 2 parents, two homeroom teachers in grade 3 and grade 4, and a school nurse using the quantitative questionnaire. All of these quantitative interviews involved the use of e-questionnaires programmed on tablets. In addition, qualitative interview questions (for focus group discussions and in-depth interviews) were also piloted on grade 3 and grade 5 students, as well as parents and homeroom teachers.

In Cam Dinh Secondary School, the quantitative questionnaires were piloted using tablets on one student and one teacher each in grade 6 and grade 7, two parents, and a school nurse. Qualitative tools were piloted on groups of students, parents and teachers.

The field pilot helped the research team to figure out the issues in the research tools, technical bugs of the e-questionnaires, and issues to be addressed with regards to logistical arrangement. After the pilot, the research team and The Foundation decided to make major changes to the quantitative questionnaires and qualitative tools to enhance the quality of collected data, and to capture required indicators more accurately. In addition, the research teams figured out several bugs in the programming of e-questionnaires, which were then immediately addressed. The pilot test also helped estimate the workload of interviewers. Based on this estimation, the research team could design an appropriate plan for the field work. Besides, inviting and scheduling parents for the interviews were recognised as a critical issue, which were targeted to be resolved in the official field work.

Stakeholder Engagement

Before engaging participants into the study, the research team closely consulted the Department of Education and Training in three provinces, the Office of Education and Training at the district level, and the School Management Boards. The consultation helped the research team to identify a suitable approach to reach different stakeholders.

Teachers and school nurses were nominated by their schools after the schools received the information from their Offices of Education and Training. The list of participants was consolidated by MDRI, and any participant who was unable to participate was requested to be replaced by another person. This was to make sure that each school had four screeners for VA screening activities.

Parents were informed about the study via information sheets sent by the schools' Management Board, with a letter inviting them for an interview. As they were informed early, they had more time to think and give their consent to let their children engage in the study. The children were also informed of the schedule of the survey and VA screening beforehand through their homeroom teachers or school nurses.

Training for school staff

Before the field work, nominated teachers and school nurses were invited to participate in a training on knowledge about RE and VA screening procedures. The trainings for school staff of target schools were held independently in three provinces on the same day. The training for non-target schools took place one month after that in Da Nang. Training curriculum were designed by an expert from the Vietnam National Institute of Ophthalmology (VNIO). In each province, MDRI cooperated with senior ophthalmologists in the provincial eye hospitals to deliver the developed curriculum to trainees.

School staff were trained with both theories and practices regarding RE and VA screening. They were able to understand the causes, treatments and preventive methods of RE, and were familiarised with VA screening practices. Half of the time of the training was devoted for practising screening, when each trainee was invited to conduct VA screening in front of the class and was corrected by the

ophthalmologists if they encountered mistakes. However, school staff in the non-target area were given more time for practising than their counterparts in target districts. This could have imposed some impacts on their performance. This will be discussed in Section 3.2.

At the end of the training session, school staff received VA screening materials and were reminded with the procedures to be implemented at their schools.

Training for enumerators

There were 12 enumerators participating in the quantitative survey of the study. All enumerators have finished their undergraduate degree and have rich experience in conducing field survey. In addition to having experience using tablets in data collection, experience in working with children is a must-have criterion to screen enumerators. Before the field work, all 12 enumerators were well-trained on the basic knowledge of RE, questionnaire content, tablet usage in interviewing and field protocol. These enumerators also had a chance to practise interviewing students for a half day, giving them an opportunity to familiarise themselves with questionnaire content, the use of tablets in the interview as well as practising their interviewing skills. The pilot test was conducted at Dong Thai Primary School in Hanoi and all enumerators had a chance to interview students at grade 3.

Upon the field survey, two enumerators per team were responsible for data collection in one school for 3 working days. During a three-day period, the team supported school staff in VA screening and interviewed 40 pairs of parent and child, as well as 4 teachers and one school nurse.

Field work implementation

Consent form was sent to parents of all students in the sample before field implementation. School nurse help to distribute the consent form to parents and collect the signed consent form well in advance of the field survey. Regarding those who refused to participate, the enumerators asked the schools to enumerate the number of refusals and accordingly, handed out consent forms to participants in the reserve list.

Several activities were undertaken with regards to visual acuity (VA) screening. After being trained by ophthalmologists, teachers and school nurses conducted VA screening for a selected list of students at their schools. At all schools, this activity was held only when the team of enumerators were working at the school in order to make sure that school staff followed a correct procedure, and when they had questions, they could ask the in-charge enumerators. With regards to screening procedure, school staff measured students' visual acuity of each eye when not wearing glasses, and visual acuity of each eye when wearing glasses (if students are already wearing glasses). School staff also took note if they identified any other abnormalities in students' eyes. In the training, ophthalmologists trained teachers and nurses to refer all those students who have a visual acuity of less than 7/10 in one or both eyes and those who have abnormalities in either eyes to doctors for further assessment. The results of VA screening performed by school staff were recorded using a standard form. Teachers and nurses noted their referrals by ticking a box in their forms.

Upon the completion of VA screening by school staff, on a separate day, ophthalmologists carried out a follow-up VA screening on 25% (randomly chosen) of school staff's VA screening sample. In the original design of the study, among the students examined by ophthalmologists, if any of them showed signs of low vision, they would be further checked to identify the causes. However, during the field work, the ophthalmologists just followed a similar procedure to that of the teachers' due to the parents not agreeing with the use of dilating eye drops on their children[1]. Ophthalmologists measured students' visual acuity when not wearing glasses, when wearing the glasses that students already had, and when wearing pinhole glasses. In addition, they examined students' eyes for other eye diseases and abnormalities. Ophthalmologists recorded the results using a standard form. For each student, they concluded whether the student had RE and/or eye diseases, and in which eye.

Quantitative interviews were conducted within 3 days in each school, by a team of two enumerators. The enumerators contacted the management board of the schools before visiting in order to make sure that

[1] This will be discussed in the next section.

proper preparation had been done by the schools, and survey activities could take place effectively. On the first day of the field work at each school, the enumerators collected all signed consent forms and worked with school staff to make sure that there were appropriate replacements to secure the initial number of participants. In some cases, when the students had been interviewed but their parents could not be approached, the enumerators interviewed extra pairs of parent-student to replace the pairs where either party was missing.

A strict quality control procedure was designed to monitor the performance of the enumerators and make sure that the data was of a high quality. All quantitative interviews were done using e-questionnaires on Android tablets, with in-built skipping patterns and verification of information. The interviews were also randomly recorded and were listened by MDRI and The Foundation to assess and improve enumerators' skills. Any issues of the e-questionnaires were reported to MDRI's data experts and were resolved quickly. Field supervision was also done by The Foundation and MDRI, and after each day, both parties discussed to identify field issues and their solutions. Updates on field issues were then disseminated to the teams of enumerators by emails and phone calls.

The qualitative component of the study was implemented by MDRI's research analysts. In each province, a team of two research analysts conducted interviews in two schools. All interviews were recorded and taken notes. This activity was also supervised by The Foundation's research staff.

After the field work, in MDRI's office, a data entry program was designed to input all VA screening results recorded by school staff and ophthalmologists into the computer. The results were entered twice by different people, and were then compared to check for inconsistencies that needed addressing. This was to ensure that the information inputted were free of errors.

2.5. Data Synthesis and Analysis

Data management

Quantitative data was managed via a three-stage procedure. The first step was the transmission of filled e-questionnaires from the enumerators' tablet onto the server. Second was the data cleaning and finalisation stage conducted in Stata 14 (a powerful statistical package) by MDRI's data management and analysis experts. In this stage, responses recorded under "other (specify)" options in the quantitative questionnaires were appropriately reclassified, and were added to the questionnaires. The final stage was data analysis (including exporting tables and running regressions) using Stata. All transformation to the data, from raw forms into the final datasets, were recorded in a set of Stata do-files, which contain all execution codes which can help replicate the results at any points of time. All of these steps were implemented electronically and confidentially.

Recordings of qualitative interview were listened to and transcribed into texts, stored as Microsoft Word files. Then, those files were imported into NVivo 11, a widely-used qualitative analysis software. NVivo was utilized to identify the common themes of qualitative data and to gain an insight into the rationale for explaining the general trend of KAP.

Weighting

Sampling weights were calculated by MDRI's sampling experts based on the initial sampling frame, and the final number of participants in the study. The purpose of having sampling weights is to adjust the proportional distribution of the sample to match that of the population that it is representing. There were two different sets of weights for the students, one for the interviews and one for the VA screenings. The latter's aim was to demonstrate the prevalence of RE in the districts more accurately. For teachers and school nurses, sampling weights at the school level were used. Weights were calculated as the reciprocal of the probability that each school, class or student was chosen into the sample. The final weight applied for each student was determined by multiplying the school's weight, the class' weight and that student's weight.

Analysis of the prevalence of RE and visual issues

Based on ophthalmologists' results, the research team calculated the number of cases of low vision based on a set of criteria (Table 2.5.1). Sampling weights were used to reflect the representativeness of the sample.

Table 2.5.1. Basis to calculate indicators of RE and eye diseases

Indicator	Description
Untreated vision problems	VA with current glasses of one or both eyes < 7/10 or presenting eye diseases in one or both eyes
Refractive error	Concluded as having RE in one or both eyes by ophthalmologists
Uncorrected refractive error	Concluded as having RE in one or both eyes by ophthalmologists and VA with current glasses of one or both eyes < 7/10
Corrected refractive error	Concluded as having RE in one or both eyes by ophthalmologists and VA with current glasses of both eyes >= 7/10
Mild cases of refractive error (that do not require correction)	Concluded as having RE in one or both eyes by ophthalmologists and VA without glasses of both eyes >= 7/10

Analysis of school staff's performance

The research team assessed the accuracy of VA screening activities by comparing school staff's and ophthalmologists' results. From ophthalmologists' results, the students who were concluded by ophthalmologists as having a vision of lower than 7/10 in either eyes (with current pair of glasses, if they already had one), or having abnormalities in either eyes, were marked as those with "positive" results. From school staff's results, the research team based solely on their final column in the result forms (about whether the student was referred for further examination) to identify those with "positive" results. This is because the study is more interested in the accuracy of the referrals that school staff made than their detailed VA results.

There were a few cases where the students brought their glasses with them when examined by school staff but did not when the ophthalmologists came to their schools, and vice versa. In such cases, the VA results without glasses were used as a basis for comparison. There were also a small number of cases when students did not show up when the ophthalmologists worked at their schools; therefore, these cases were dropped in the analysis.

School staff's results were then compared to those of ophthalmologists by a set of indicators, consisting of sensitivity, specificity, positive predictive value and negative predictive value. The indicators are calculated based on the number of cases in each category in Table 2.5.2. They are explained in more details in Table 2.5.3. Higher values of these indicators demonstrate better performance of school staff.

Table 2.5.2. Result matrix of school staff's performance

	Ophthalmologists		Total
School staff	**Low VA**	**Normal VA**	
Low VA	A	B	A + B
Normal VA	C	D	C + D
Total	A + C	B + D	

Table 2.5.3. Description of indicators demonstrating school staff's performance

Indicator	Calculation	Description
Sensitivity	A / (A + C)	The ability of school staff to identify low VA (The proportion of actual cases of low VA that are correctly identified by school staff)
Specificity	D / (B + D)	The ability of school staff to identify normal VA (The proportion of actual cases of normal VA that are correctly identified by school staff)
Positive predictive value	A / (A + B)	The proportion of cases classified as low VA by school staff that are actually low VA cases
Negative predictive value	D / (C + D)	The proportion of cases classified as normal VA by school staff that are actually normal VA cases

Analysis of knowledge, attitudes and practices

The knowledge, attitudes and practices of students, parents, and teachers, as collected in the form of quantitative data were calculated into aggregate indicators. Specifically, with regards to attitudes, in the quantitative survey, respondents were asked about their opinion with a set of statements regarding RE and glasses wearing using a 5-point Likert scale, comprising the options "Absolutely disagree", "Disagree", "Neutral", "Agree", "Absolutely agree". The responses were accordingly numerate as 1, 2, 3, 4 and 5. The scores were averaged to measure the attitude of each respondent toward spectacle wearing as a ratio. The higher the score, the better the attitude toward spectacles wearing.

In Stata 14, a complex set of codes was written to export the results into tables in excel format. Sampling weights were applied to make the statistics more representative. All of these calculations, as well as modifications to the data, were recorded in a set of Stata do-files, and can be replicated at any points of time.

For each indicator, exported results included total values and the values for different groups of respondents based on their location, gender, school level, area type (urban or rural), per capita income quintiles, and the parent's highest level of education. P-values of T-tests and Pearson's chi-squared tests were estimated to show statistically significant differences between average values of different groups.

This report, however, just highlights significant findings that are meaningful to the study. More specific results can be found in a supplementary document detailing all survey indicators.

Analysis of factors associated to students' knowledge

Econometric models were used to identify the factors that affect students' knowledge about RE and eye health. Students' knowledge was used as the dependent variable. It was calculated as the sum of average score of students' correct answers acquired in each question in the part on knowledge of RE and eye health. A similar approach was applied to estimate the knowledge score of parents and of school staff. Separate econometric models were run for primary students and lower-secondary students as their mean scores were statistically different (at 99% of confidence). Both random effects and school-fixed effects were used for each category of students. The inclusion of the school-fixed effects has controlled for the heterogeneity among students' characteristics as well as the variation among teachers' characteristics caused by variation among different schools.

There were three groups of independent variables included in the econometric models, namely students' characteristics, family endowment and school characteristics, which would affect the knowledge of students about RE and eye health. A detailed list of independent variables is presented in the Appendix "Tables for Factors Affecting KAP of Students".

2.6. Ethical and other Approvals Obtained

An ethical approval application was lodged to the Ethical Review Board of the Hanoi Medical University in early December 2016. The application was assessed through a full review procedure and was approved in late January 2017. A copy of the final approval letter (Ref No. 57/HDDDDHYHN) is attached in the appendix.

An informed consent form was sent to the parents of each student chosen to participate in the study. Only the students whose parents agreed with their participation (proven by a signed consent form) were involved in the study (consisting of visual acuity screening and interviews).

The survey was also approved by the Project Management Board in the Department of Education of Training at each of the three provinces. The Department in each province also provided strong support to arrange logistics, in order to help the enumerators to approach the schools more easily.

III. RESULTS AND DISCUSSION

3.1. Response Rate

The response rate varies among stakeholders in the baseline study. While teachers and school nurses demonstrated an absolute response rate (100%), the response rates of students and parent were lower, with just about 90% of students in the official list participating in VA screening performed by school staff. This figure was 75.19% in the quantitative interview. The response rate was quite similar among provinces in the target sample (Table 3.1.1). It should be noted that the high attrition rates of quantitative interviews are mostly because the parents of selected students were busy and could not be approached. In such cases, they were replaced by other pairs of student and parent in the reserve list.

The response rate can be improved in the endline survey through well informing the participants in advance, conducting the survey in the middle of the second semester and approaching parent outside the business hours.

Table 3.1.1. Response Rate of students and parent in the baseline survey (% of official sample)

Locations	**VA screening** (%)	**Quantitative interview** (%)
Total (Target only)	88.90	75.19
Hai Duong	86.35	77.81
Da Nang	86.12	71.19
Tien Giang	94.23	76.88
Non-target (Da Nang only)	99.69	72.78

3.2. School-based Visual Acuity Screening

As previously mentioned in the Study Design section, visual acuity (VA) assessments were conducted by trained teachers and nurses at all schools participating in the survey, covering a sample size of 4,838 students. Around 30% of these students were then randomly selected for a close-up examination by ophthalmologists, making up a sub-sample of 1,404 students.

Prevalence of RE and visual issues

As demonstrated in Table 3.2.1, the overall prevalence of RE is 24.64% in the target area, of this, 17.94% are corrected, 11.54% are mild cases, and 70.53% are uncorrected cases. RE affects 32.65% of the student population in the non-target districts of Da Nang, 44.27% of those in Da Nang's targeted districts, 35.60% of those in Hai Duong and only 6.42% of students in the project's target areas in Tien Giang, where the prevalence of RE is the lowest.

Breaking down these results by classification criteria also revealed some interesting trends. There is no proven difference between male and female students in terms of eye diseases and RE, however, there is a significant difference (at 99% of confidence) of 27.59% in the prevalence of RE (in one or both eyes) in rural (14.26%) compared to urban (41.85%) areas, proving once again a well-observed fact in the eye care community. In addition, lower-secondary students are more likely to have untreated eye diseases and RE than their primary counterparts (at 99% of confidence).

While there are several notable differences in the prevalence of eye issues and RE between provinces, area types and school levels, there is no striking difference in terms of corrected, mild or uncorrected RE proportions across those classification criteria. The general trend is that only 15 to 20% of RE cases have been corrected, together with around 10% of mild cases requiring no treatment and leaving behind 60% to 70% of uncorrected cases.

It has also been shown from the results that the prevalence of untreated vision problems (including RE) in one or both eyes varies among areas. Specifically, Tien Giang has a significantly lower proportion of untreated cases of visual issues (around 4.49%) than in other provinces. The non-target area in Da Nang also shows a lower level of prevalence compared to the targeted area in the same province (23.66% compared to 31.94%, verified by a t-test at 95% of confidence). Meanwhile, there are no statistically significant difference between the target areas in Da Nang and Hai Duong. The average prevalence of untreated eye issues is around 28 to 32% of in these two areas.

Table 3.2.1. Prevalence of untreated vision problems and RE by province and project area

		Untreated vision problems (including RE) (%)	**RE in general (including corrected cases)** (%)	**Uncorrected RE** (%)	**Corrected RE** (%)	**Mild RE that do not require correction** (%)
Da Nang (Non-target)						
	n	303	303	98	98	98
	%	23.66	32.65	72.46	15.21	12.33
	CI95% L	18.85	27.34	63.45	7.98	5.70
	CI95% U	28.47	37.96	81.46	22.45	18.96
Total (Target only)						
	n	1039	1039	325	325	325
	%	18.52	24.64	70.53	17.94	11.54
	CI95% L	16.16	22.02	65.54	13.74	8.05
	CI95% U	20.89	27.27	75.51	22.13	15.03
By location (Target only)						
Da Nang	n	390	390	183	183	183
	%	31.94	44.27	70.56	14.92	14.52
	CI95% L	27.29	39.32	63.90	9.71	9.36
	CI95% U	36.58	49.23	77.23	20.13	19.67
Hai Duong	n	297	297	122	122	122
	%	28.57	35.60	70.64	19.00	10.35
	CI95% L	23.40	30.13	62.45	11.94	4.87
	CI95% U	33.74	41.08	78.84	26.06	15.83
Tien Giang	n	352	352	20	20	20
	%	4.49	6.42	69.97	26.42	3.61
	CI95% L	2.32	3.85	47.96	5.25	-5.35
	CI95% U	6.67	8.99	91.98	47.60	12.56

Performance of school staff in conducting VA assessment

The performance of school staff plays a key role in the effectiveness of school eye health intervention because their initial stage of VA screening will help determine the students who need further examination by ophthalmologists. It is important to maximise correctly specified positive cases and avoid false negative cases as these would be against both the students' and the project's interests.

Table 3.2.2 below shows some diagnostic statistics demonstrating the accuracy of VA screening performed by school staff. Target and non-target areas are separated and the "Total" value only considers target areas as some interventions have only been undertaken there.

Table 3.2.2. Performance of school staff by location

		Sensitivity (%)	**Specificity** (%)	**PPV** (%)	**NPV** (%)
Da Nang (Non-target)					
	%	69.01	90.09	68.06	90.48
	CI95% L	57.99	86.21	57.02	86.66
	CI95% U	80.04	93.96	79.09	94.29
Total (Target only)					
	%	60.92	93.76	74.36	88.98
	CI95% L	54.68	92.08	68.18	86.86
	CI95% U	67.17	95.44	80.54	91.10
By location (Target only)					
Da Nang	%	56.06	92.64	79.57	80.47
	CI95% L	47.48	89.43	71.22	75.94
	CI95% U	64.64	95.84	87.92	85.01
Hai Duong	%	65.59	89.71	74.39	85.12
	CI95% L	55.75	85.50	64.74	80.32
	CI95% U	75.43	93.91	84.04	89.91
Tien Giang	%	76.92	97.05	50.00	99.10
	CI95% L	50.42	95.24	25.99	98.07
	CI95% U	103.42	98.86	74.01	100.12

In the target area, school staff's overall performance is reflected by a sensitivity measure of 60.92%. It means that only 60.92% of students with either eye abnormalities or whose vision is lower than 7/10 in one or both eyes were identified by school staff. The specificity level demonstrates that 93.76% of students with good vision are recognised by school staff, leaving a false positive rate of approximately 6.24%. Among the students who were referred to ophthalmologists, 74.36% were actual cases of low vision (as shown in the positive predictive value). This means that ophthalmologists would need to spend extra time and efforts on the 25.64% of students who were incorrectly referred to them.

In the non-target area in Da Nang, the sensitivity, specificity, positive predictive and negative predictive values are respectively 69.01%, 90.09%, 68.06% and 90.48%. In comparison with those of the target area in the same province, these statistics demonstrate a better coverage of correct referrals, however they also indicate a slightly higher level of false positive cases, as shown by a lower specificity measure.

Across the surveyed provinces in the target areas, Hai Duong performed significantly better than Da Nang in terms of sensitivity, with 9.53% more cases of low vision being identified. Between Tien Giang and two other provinces, although the sensitivity measure seems to be higher, statistical tests prove that they only feature a significantly higher level of specificity, lower level of positive predictive value and higher level of negative predictive value, without any firm evidence backing the difference in sensitivity. These do not mean that school staff in Tien Giang performed better, but are most likely the results of the low prevalence of low vision and RE in Tien Giang.

Statistically significant differences have been revealed between urban and rural areas. Statistical test results have demonstrated that in rural areas, school staff are better at identifying low vision, with a sensitivity measure of 74.00%, compared to 57.45% in urban areas. Their positive predictive value is also significantly lower and they also demonstrate a higher negative predictive value. This implies that rural school staff have fewer cases of false negative results.

Discussion on prevalence of RE & visual issues and school staff's performance

This part discusses the results of VA screenings, including figuring out the proportion of school children with untreated vision problems, uncorrected RE and corrected RE in the surveyed areas and assessing the accuracy of VA screening at the school level. Regarding the prevalence of presenting low VA and RE among school children, the results of this study confirm previously investigated trends in surveys in other Vietnamese locations. The accuracy of school staff's screening activities, however, is lower than previously observed in other provinces, with some noticeable differences across location and area type.

Compared to some studies in Vietnam, the rates of RE in this study are considerably consistent. Le Thi Thanh Xuyen et al. (2009) reported that the rate of RE in Ho Chi Minh City was 39.35%, with a notable difference between rural and urban areas. Vu Thi Thanh et al. (2009) also concluded a myopia rate of 33.7% in Ha Noi, with the figures rising above 40% in central urban districts. In Vung Tau, Paudel et al. (2014) observed an overall rate of RE of 21.5%, more specifically 27.5% in the urban area, but just focusing on lower-secondary schools. This study's results regarding the prevalence of RE in Da Nang (44.27%), Hai Duong (35.60%) and Tien Giang (6.42%) can be considered consistent, with an overall rate of 24.64% in all three provinces. Discrepancies between these provinces can be due to the unbalanced proportion of rural and urban schools, as well as of primary and lower-secondary schools among them. Specifically, all schools in Da Nang's target area are urban schools while most of the schools in Tien Giang are located in rural areas.

A limitation of this study is that due to parents' disapproval with the ophthalmologists' use of dilating eye drops when conducting eye examination at the schools, students' specific RE condition (myopia, hyperopia or astigmatism) was not collected. Instead, the ophthalmologists examined the students' VA like the school staff did to assess their accuracy. If any abnormalities were noticed, a result form has been sent to the parents to inform them so they can have their child further checked by an eye specialist. Therefore, without such information, comparison with existing studies in terms of each condition is not possible.

In terms of school staff's performance, the overall performance in the target area is much weaker than previously reported by Paudel et al. (2014) in Vung Tau, where the accuracy is observed at 86.7% sensitivity, 95.7% specificity, 86.7% positive predictive value and 95.7% negative predictive value. When compared to studies in other Asian countries (Table 3.2.3), the sensitivity and specificity measures in this study are only higher than those of Iran. Nevertheless, those studies mostly approached secondary school students. When it comes to screening primary school children's VA, most previous studies feature lower detection rates.

Table 3.2.3. Comparison of VA screening results with other studies

Location	Author	Cut-off	School level	Results
China	Sharma et al. (2008)	≤20/40 (5/10)	Secondary	Sensitivity 93.5% Specificity 91.2%
Thailand	Teerawattananon et al. (2014)	≤20/40 (5/10)	Primary	Sensitivity 59% Specificity 98%
Vung Tau - Vietnam	Paudel et al. (2014)	≤20/40 (5/10)	Secondary	Sensitivity 86.7% Specificity 95.7%
Iran	OstadiMoghaddam et al. (2012)	≤20/25 (8/10)	Both primary and secondary	Sensitivity 37.5% Specificity 92%
This study		*<7/10*	*Both primary and secondary*	*Sensitivity 60.9%* *Specificity 93.8%*

One factor affecting the screening performance of school staff which has not been frequently discussed is the quality of the training given to them. Paudel et al. (2014) only mentioned that they conducted a half-day training session with practice and provision of necessary equipment. This is very similar with the training sessions that were held at the three provinces before the field work of this study. However, it has been noticed during The Foundation and MDRI's supervision that the school staff (especially in Da Nang's target area) were initially not very confident when implementing VA screening at their schools, and were not clear about how to record results on the VA form. This was improved by The Foundation and MDRI in the survey in the non-target area by providing school staff more time to practice before the field work. That might explain why school staff in the non-target area performed significantly better than their colleagues in targeted schools.

The fact that school staff in rural areas performed significantly better than those in urban schools might be attributed to two factors. Firstly, in rural areas, eye issues are less prevalent, and thus school staff had more time to examine the students who showed signs of low vision. In urban areas, with a high rate of untreated visual issues at around 30%, school staff's attention was more diverted. In addition, teachers could only conduct VA screening during a fixed amount of time allocated for this activity in the timetable and very few schools allowed extra time. This fixed amount of time and the large proportion of students with low vision might have affected the quality of their screening activities.

A small number of unidentified cases of eye problems (8/118 – in the whole target and non-target sample) such as conjunctivitis, blepharitis, conjunctiva stones and retinal detachment were encountered by school staff. They were often overlooked as school staff have not been trained to identify such abnormalities. Although the proportion of students with these diseases is small, the project may consider training school staff on identifying these abnormalities and how to correctly refer these students for treatment.

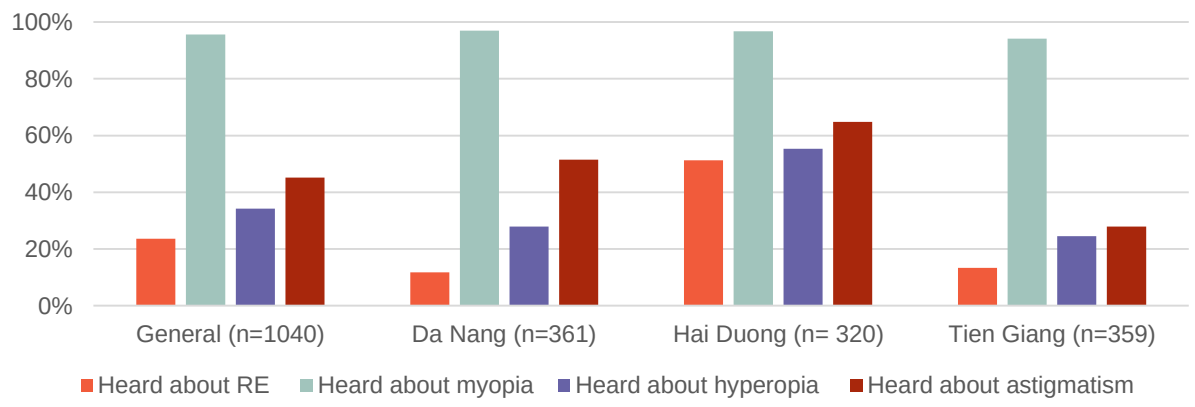
3.3. Knowledge of Refractive Errors and Eye Health

Students

Diseases, symptoms, treatment and prevention for REs

In the three target provinces, 23.65% of students have on average heard about RE (compared to just 4.60% non-target areas). In general, most students have heard about myopia (95.66%)[2] and a good proportion have already heard about hyperopia (34.26%) and astigmatism (45.12%). While considerable differences exist between the three provinces (Chart 3.3.1), only minor and insignificant differences have been found across genders in terms of knowledge. On average, students in Tien Giang have significantly less knowledge about each form of refractive error, their symptoms, treatments and preventive methods.

Chart 3.3.1. Proportion of students exposed to RE terminologies by province



[2] Without significant difference between these provinces

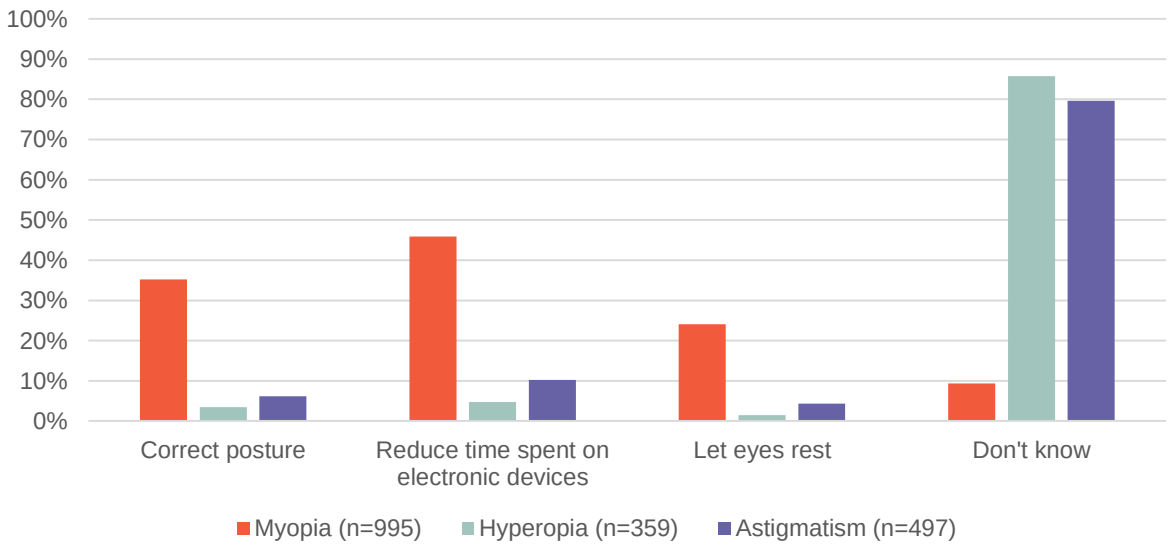
Across the three provinces, students have significantly better knowledge about myopia than hyperopia and astigmatism regarding their symptoms. Blurred vision is by far the most predominant symptom recognized by every sub-group of students for refractive error. Nevertheless, although above 80% of those with familiarity to myopia were able to mention this symptom, only around 30% were able to mention the same symptom for both astigmatism and hyperopia. Other symptoms only account for less than 10% of the responses for all RE. No significant results that are meaningful for the study have been found across genders.

The treatment of myopia is more knowledgeable than that of hyperopia and astigmatism. A large majority correctly mentioned eyeglasses as an appropriate treatment for myopia (among 88.61% of those who know about myopia). However, for astigmatism, this treatment is relatively less recognized (among 33.69% of those who know about astigmatism). Besides, some students incorrectly regard medicine (around 6%) and/or eye practice (around 1.5%) as appropriate treatments. Around 10% of the respondents believed that seeing a doctor or by simply looking from a closer distance would be an appropriate treatment for myopia and/or astigmatism. This view is significantly more prevalent in urban areas. The prevalence of these answers indicates that the respondents lack of basic knowledge on RE treatment, and thus failed to address the main points of the questions.

When students were asked about preventive methods for RE, many of them were able to list several methods for myopia but more than three-fourth of them remain unaware of hyperopia and astigmatism prevention (Chart 3.3.2). The most listed myopia's preventive methods in Hai Duong and Tien Giang are having a correct posture while studying (respectively 55.89% and 33.58%); reducing the time spent on TV and electronic devices (respectively 53.89% and 32.04%); and letting eyes rest for five to ten minutes after forty-five minutes of continuous reading, learning or working on electronic devices (respectively 33.74% and 22.53%). These methods are significantly more listed in Hai Duong than in Tien Giang and in Da Nang, except for reducing time spent on electronic devices which was listed by 58.91% of Da Nang students. Far too few students did show awareness that the installation of anti-reflective chalkboard in the classroom (0.00%), doing exercise and outdoor activities, getting enough and balanced nutrients, and doing eye check-up for every six months constitute appropriate preventive methods of RE.

There exists a significant proportion of students having misunderstanding on the preventive method of RE. For instance, a large proportion of students, especially in target areas within Da Nang (40.24%), responded that watching TV from a farther distance would help prevent myopia. This belief is significantly stronger in urban areas (35.41%) than in rural areas (17.44%).

Chart 3.3.2. Comparison of student's common preventive methods against RE



The only differences across genders are that female students significantly had less idea how to prevent astigmatism (85.03% vs. 74.98% of male did not know) and, among the students who knew, significantly more male listed reducing the time spent on electronic devises as a preventive method of astigmatism. Significantly more students in rural areas compared to urban ones and, in non-target areas within Da Nang compared to target areas within Da Nang had no idea how to prevent RE.

Pink eye

On average, 70% of the students have heard about pink eye and of these students, 90% are familiar with its symptoms (apart from Tien Giang and rural areas where the proportions are much smaller). Red eye was the single-most mentioned symptom by the students. They appeared less familiar to other symptoms, such as watering eyes, itchy eyes, large amount of eye discharge, and light swelling of eyelid. In the three provinces, eye pain and burning feeling in the eyes were mentioned by 21.15% of the students.

The majority of students were unable to mention specific preventive methods of pink eyes. Less than a third of the students in Hai Duong (30.85%) and Da Nang (27.90%) were unaware about pink eye prevention, and these proportions were higher for Tien Giang (53.36%) and non-target areas within Da Nang (43.33%). Avoid touching eyes with dirty hands was the most mentioned preventive method (10.69%). In addition, a relatively large proportion of wrong answers listed by students, especially in Hai Duong and target areas within Da Nang, were found for pink eye prevention, such as not looking at people with pink eye (more than 20%)[3].

Trachoma

Relatively fewer students have heard about trachoma (on average 7.22%), and even those who know about demonstrated insufficient knowledge. Specifically, among those who have heard about it, many students remain unaware its symptoms, especially in Tien Giang (36.83%) and in target areas within Da Nang (54.55%). Among the correctly listed main symptoms were uncomfortable eyes (33.46%) and itchy eyes (13.59%). On average, 78.11% of the students in each province who have heard about trachoma remain rather uninformed about its preventive methods.

Vitamin A

Students are well-aware that vitamin A is good for the eyes (88.54%). In urban areas, significantly more students know that vitamin A is good for the eyes and where to access it. On average 28.94% of students were able to name all the three correct answers for fruit and vegetable types rich in vitamin A without naming wrong types (tomatoes, carrots and papaya), and 70% were able to name at least two correct answers. Females are better at identifying all the three correct types without any incorrect ones compared to males (34.58% compared to 24.54%, with statistical significance).

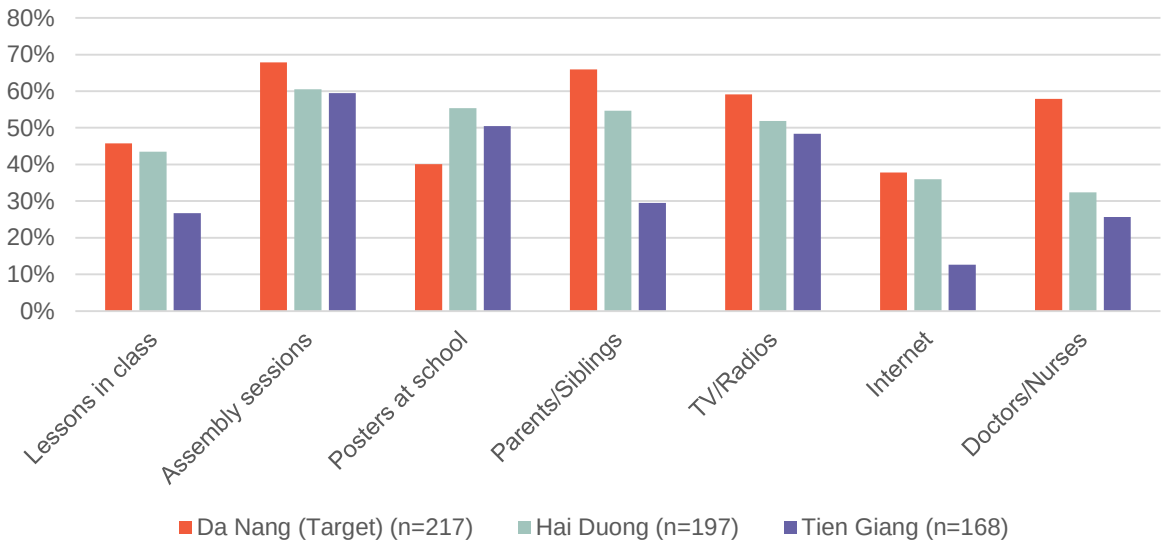
Access to information

Access to information differs among Hai Duong, Da Nang and Tien Giang, (Chart 3.3.3). In the past year, 72.77% of students in Hai Duong had heard of information regarding eye care and eye diseases and/or RE prevention, while this figure was only at 53.38% in target areas within Da Nang and 47.70% in Tien Giang. These differences suggest that students in the latter two provinces face more limited access to information. More than half of students were able to recall that the content of information to which they had accessed included about (i) the prevention of myopia, hyperopia, astigmatism and, (ii) eyes diseases and preventions (51.86%).

The main sources of information differ significantly between the provinces, and target and non-target areas, respectively. The most predominant information source is from assembly sessions (62.10%), followed by TV (52.54%) and posters (49.48%). Doctors are also an important source of information, especially in target areas within Da Nang, as well as parents. While posters have a major importance for access to information in rural areas, internet is significantly more used in urban areas. Parents and doctors are also significantly more predominant sources of information in urban areas (20%-point more).

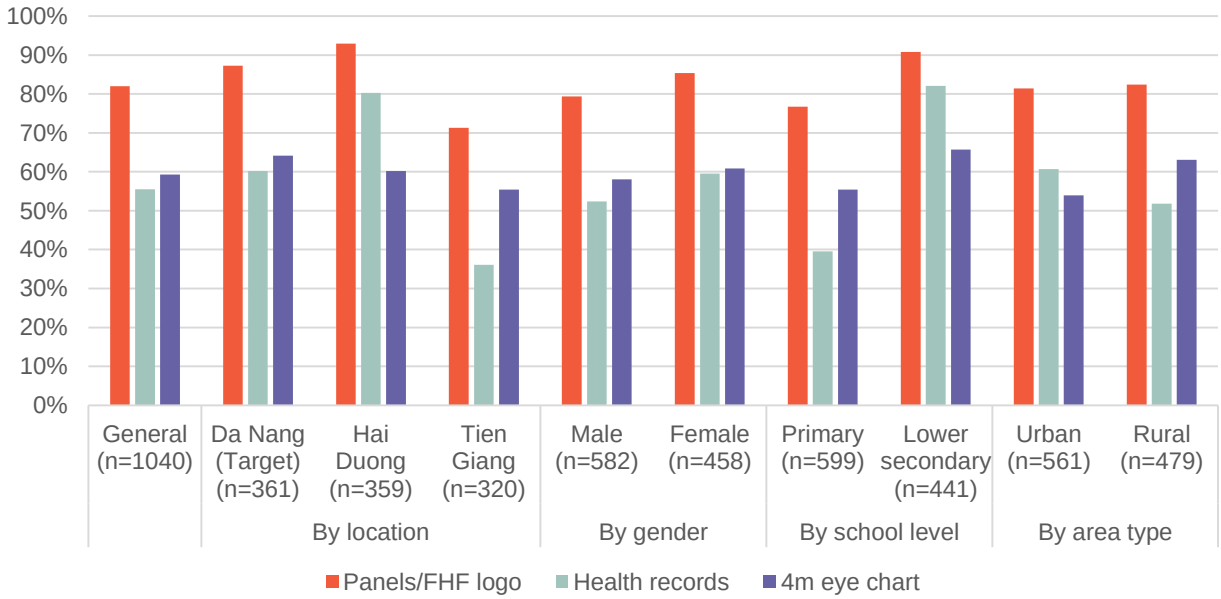
[3] (21.13% on average in Hai Duong and in Da Nang target and only 6.00% in Tien Giang)

Chart 3.3.3. Student's sources of information on eye care by province (among those who were exposed to information only)



The Foundation's materials were recognised more by their logo (81.99%) than 4m eye chart (59.27%) and health records (55.49%) (Chart 3.3.4). While in Hai Duong and Da Nang fewer than 3.5% of the students have never seen The Foundation's communication materials, almost a quarter of students in Tien Giang have. Except for the 4m eye chart and among those who have seen The Foundation's communication materials, Hai Duong students are significantly more capable of recognising The Foundation's communication materials than Da Nang students and Tien Giang students. The results also show that female students are more likely to recognise FHF logo, health record and the 4m eye chart in comparison with male students. Furthermore, the lower secondary students are far better identifying those materials than the primary students (Chart 3.3.4).

Chart 3.3.4. Students' recognition of The Foundation's materials by categories



School and TV are the two most common places that students saw the Foundation's materials. 89.90% of students saw The Foundation's material at school, and around 20% mentioned seeing material on TV. Other sources were only given by a small proportion of students.

Despite the high level of exposure, more than half of the students could not recall the key message of The Foundation's materials (54.45%). Among those who could, they mostly remembered that to prevent RE, "one should let eyes rest for 5-10 minutes after every 45 minutes of continuous exposure to computer or electronic devices" (31.1%). The other preventive message "Study with correct posture and under sufficient lighting for healthy eyes" is also most reported information by students (20.6%).

Gender

There are no major significant differences between male and female students that can be useful for further understanding of the study, except the fact that slightly more female students were able to recognise The Foundation's communication materials than their male counterparts. For example, 85% and 79% of female and male students respectively recognised The Foundation's logo. A similar pattern was observed regarding recognition of health record (Chart 3.3.4).

Parents

Diseases, symptoms, treatment and prevention for RE

Fewer than half of the parents interviewed have heard about RE, however most parents have heard about myopia (94.87%), less about hyperopia (74.13%) and even less about astigmatism (67.84%). Parents in Da Nang possess significantly better knowledge on myopia, hyperopia and astigmatism regarding symptoms, treatment and prevention compared to the other target provinces. An explanation is that Da Nang parents enjoy greater access to information on eye disease, care and prevention.

The symptoms of myopia are significantly more known about than those of hyperopia and astigmatism[4]. However, the single-most identified symptom was blurred vision[5], while other symptoms were listed by less than 10% of the parents in each province. Female parents identified symptoms such as squinting more frequently compared to male parents (with statistical significance).

For the treatment of RE, a decent proportion of the parents gave good answers. However, misconceptions about methods of treatment remain prevalent. With regards to myopia, spectacles wear was on average listed by 88.79% of the parents in each province. Surgery was significantly more often listed as a treatment in Da Nang (10.28%) and Tien Giang (5.54%). While a little less than half of the parents appeared unaware of treatments for astigmatism, only half of the parents with awareness of treatment for astigmatism mentioned spectacles wear. Similar to students, misconceptions remain prevalent among parents. Around 15% of parents in Da Nang and Hai Duong, respectively, were found to believe that medicine can treat myopia.

Similar to students, parents were significantly more able to identify preventive methods for myopia than for hyperopia and astigmatism. Almost 57% of parent points out "reducing the time spent on TV and electronic devices" being the popular preventive approach against myopia. Correct posture and having enough lighting while learning also are most mentioned by parents, 41% and 34% respectively. Similar to students, a quarter of the parents were found to believe that increasing the distance to the TV while watching is a method of myopia prevention.

Pink eye

A very large proportion of parents have heard about pink eye (90.69%) and its main symptoms, but lack of knowledge about preventive methods remain prevalent. The main symptom identified was red eye (79.63%). Other symptoms, such as watery eyes (26.49%), itchy eye (33.81%), and a large amount of eye discharge (30.05%) are mentioned by a little less than a third, while light swelling of eyelid is only listed by 16.57% of them. Parents have limited knowledge on preventive method of pink eyes, such as washing face with clean water (18.09%), not sharing clothes (19.72%), and avoiding interaction with

[4] On average, 10.89% of the parents in each province did not know the symptoms of myopia while respectively 50.30% and 52.13% did not know the symptoms of hyperopia and astigmatism.

[5] On average, respectively 76.97%, 41.46% and 40.25% of the parents in each province named blurred vision as a symptom of myopia, of hyperopia and of astigmatism.

people with pink eye (17.29%). However, very few parents were able to mention methods as simple as washing hands with soap regularly (5%). Furthermore, although many parents have some ideas of how to prevent pink eye, their understanding is not sufficiently in-depth, as 46.31% of them for instance listed eye sanitisation (with no descriptions of procedure) as a preventive method.

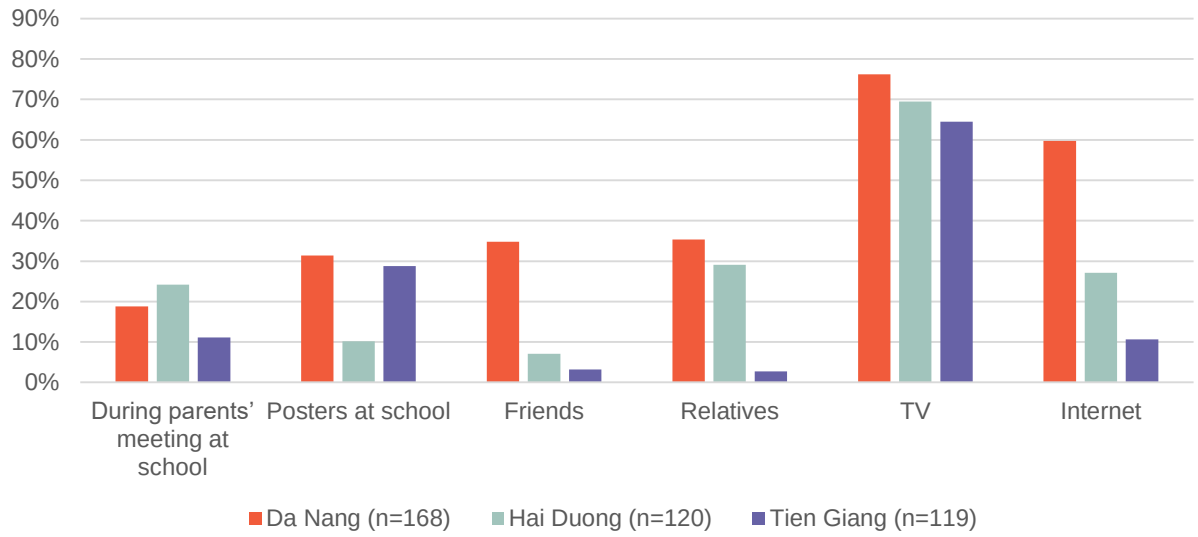
Trachoma

Parents have limited understanding on trachoma. Many parents in Hai Duong and Da Nang have heard about trachoma (75%), while a fewer proportion was reported in Tien Giang (57.67%). Among those who have heard about trachoma, significantly high proportion of parents in Tien Giang are unaware of the symptoms and lack knowledge about how to prevent it (58%). In Hai Duong and Da Nang, 50.27% and 35% of the parents identified uncomfortable eyes and itchy eyes as symptoms. To prevent trachoma, 20% of the parents mentioned washing hands regularly with soap.

Access to information

Almost 40% of the parents had access to information on eye care, with the dominance of TVs, the internet, friends and relatives as the main sources (Chart 3.3.5). The TV was the most mentioned source of information (69.71%). In Hai Duong and Da Nang, relatives are a major source of information as well (31.95%). In Da Nang and Tien Giang, posters are also important (30.12% versus 10% in Hai Duong). In Da Nang, Internet appeared to be a significantly more important source of information (59.77%), five times more than in Tien Giang and three times more than in Hai Duong. The content of information was mostly eye diseases and prevention (67.66%) and prevention of RE (61%).

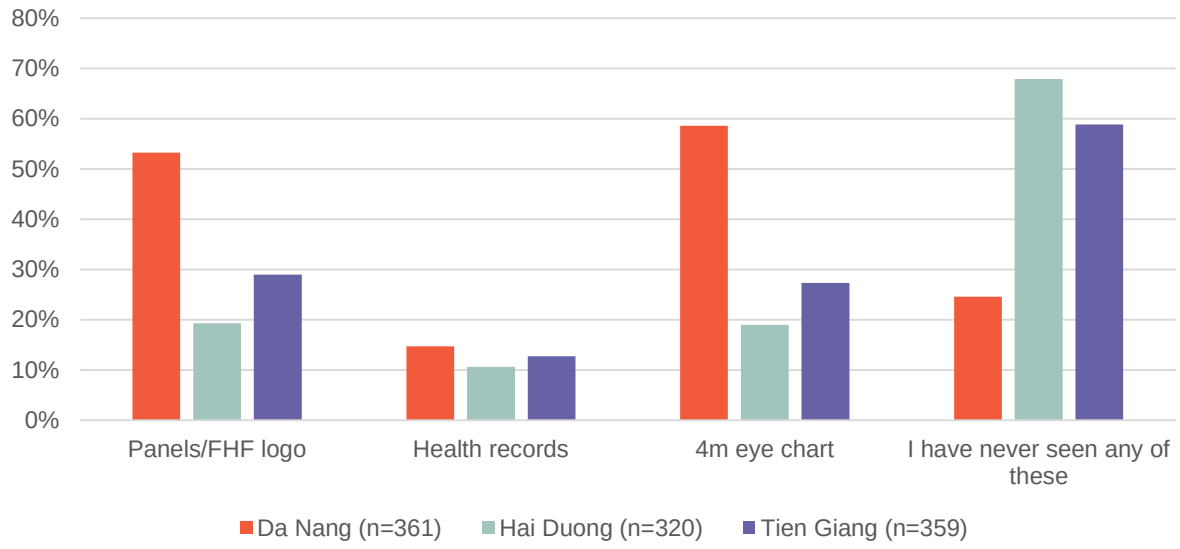
Chart 3.3.5. Parent's sources of information on eye care



Parents tended to recognise The Foundation's eye chart and banners/panels/logo more than health records; however, a large proportion of parents have never seen any of these materials. Apart from health records, Da Nang parents recognised far more materials than parents in Tien Giang and Hai Duong. More than half of Da Nang parents recognised the logo as well as the 4m eye chart, for Tien Giang it is more than a quarter of the parents and less than a fifth of them in Hai Duong. Additionally, parents of primary students recognised significantly more materials than parents of secondary students. In rural areas, a significantly larger proportion of parents compared to urban areas have never seen The Foundation's materials.

Among those who were exposed to information, 71.87% of the parents in Hai Duong did not remember the content of The Foundation's materials while only 53.34% of the parents in Da Nang and in Tien Giang did not. The low rate of correct recall the message from propaganda materials among parents reflects that parents did not pay attention to those materials even though they were exposed to the materials. The qualitative interview has highlighted the reason why parents did not remember the message from flyers and poster (Box 3.3.1).

Chart 3.3.6. Parent's recognition of The Foundation's materials



Box 3.3.1. Respondents' answers regarding communication methods in qualitative interviews

In terms of the method of communication, qualitative interviews suggest that an interactive method is preferred among the respondents.

"*I recommended my children and grandchildren, and people around me who have small children to directly attend communication sessions.*

I think that direct attendance in communication sessions would be the best option. People with low educational background won't read flyers, especially for those in rural areas, they rarely read those things. If we listen directly, we would learn faster."

The grandmother of a student in Cho Gao district, Tien Giang.

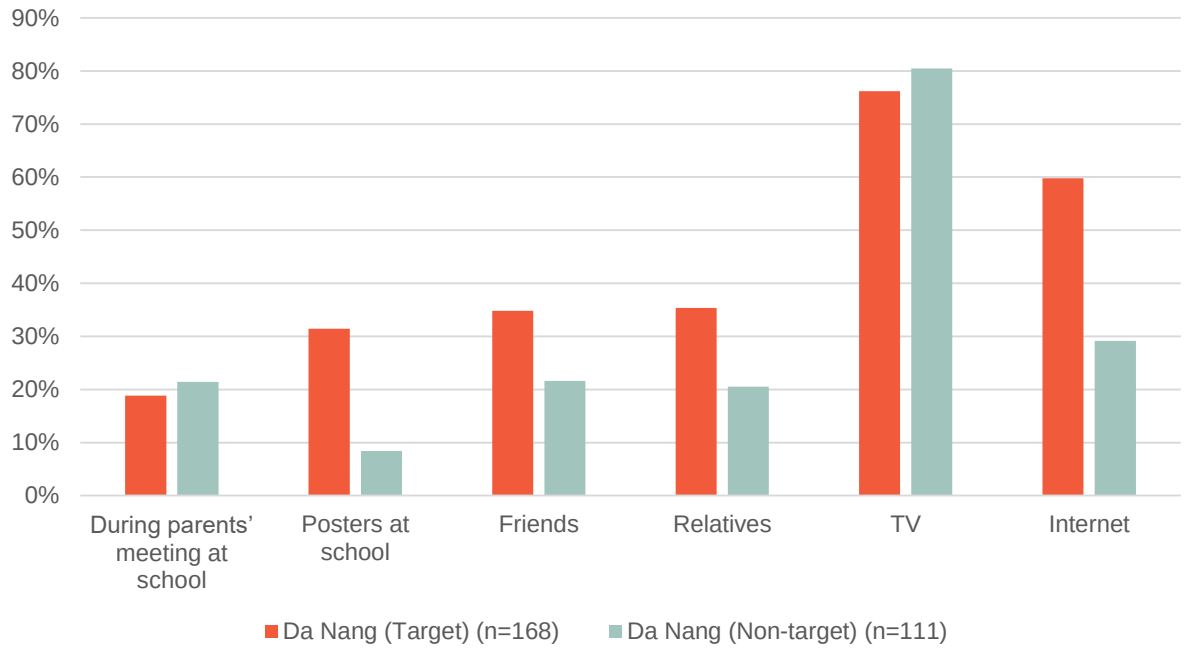
"*Using panels and flyers is also one method, but I think that the most effective way to communicate would be to adopt an interactive method. […] As for panels and flyers, those students who are curious may notice and read them, but some won't pay any attention. For parents, it's the same, they only care about things that are related to them, for example. […]*"

A school nurse in Hoa Vang district, Da Nang

Da Nang target and non-target groups

Parents in Da Nang's target group were found having significantly more knowledge about RE, its various types, symptoms, treatment and prevention methods. Additionally, parents in the target group were found having significantly more access to information regarding eye care and eye diseases prevention. The main sources of information vary between the two groups. While TV was found to be the main source of information for both group without significant difference (78.35%), internet, relatives, friends and posters were significantly more mentioned as sources of information by parents in the target group than in the non-target one (Chart 3.3.7).

Chart 3.3.7. Differences between main sources of information of parents between target and non-target schools in Da Nang



Rural and urban areas

Parents in rural areas have significantly less knowledge about RE and eye diseases, its various types, symptoms, treatment and prevention methods, especially for hyperopia, astigmatism, and trachoma. They were also found to be significantly less aware of the benefits of vitamin A on eyes, and less able to identify fruits and vegetables types being rich in vitamin A. Additionally, parents in urban areas possess deeper knowledge about pink eye symptoms.

Teachers and school nurses

All the teachers have heard about hyperopia, myopia and astigmatism. However, nearly only 70% of them were able to correctly identify all three types as refractive error. Myopia and hyperopia appeared to be the most familiar RE to the teachers. A vast majority of them were able to list the most common symptoms, treatments and preventions for those types. Besides, astigmatism remains relatively less known by teachers. A break-down of results show that the proportion of teachers in target areas being unaware about the symptoms of hyperopia and astigmatism is 8.38% and 20.40% respectively.

As pink eye and trachoma are quite common types of eye diseases in Vietnam, most of the teachers therefore were found to have some understanding about those diseases as well as their symptoms and preventive methods (Chart 3.3.8 and Chart 3.3.9).

Chart 3.3.8. Teacher's knowledge of the symptoms of pink eyes

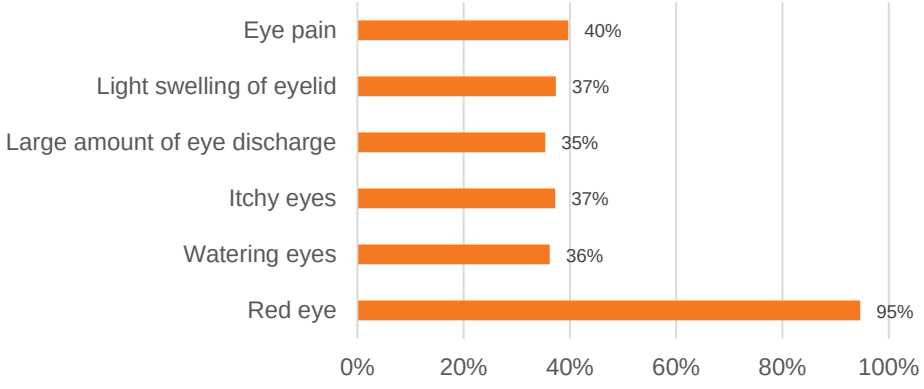
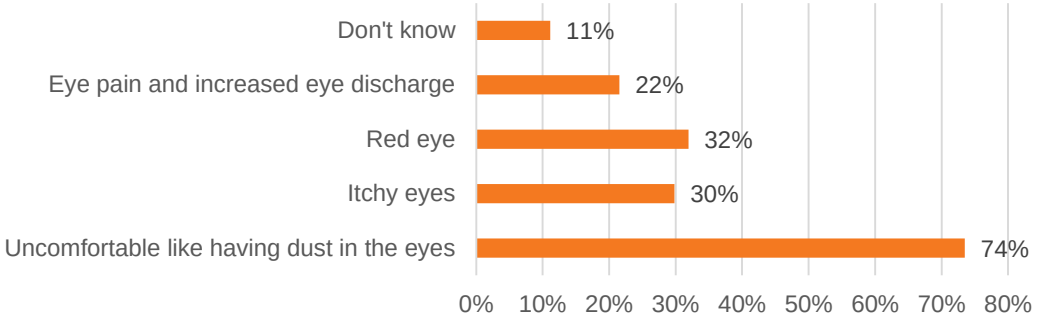


Chart 3.3.9. Teacher's knowledge of the symptoms of trachoma



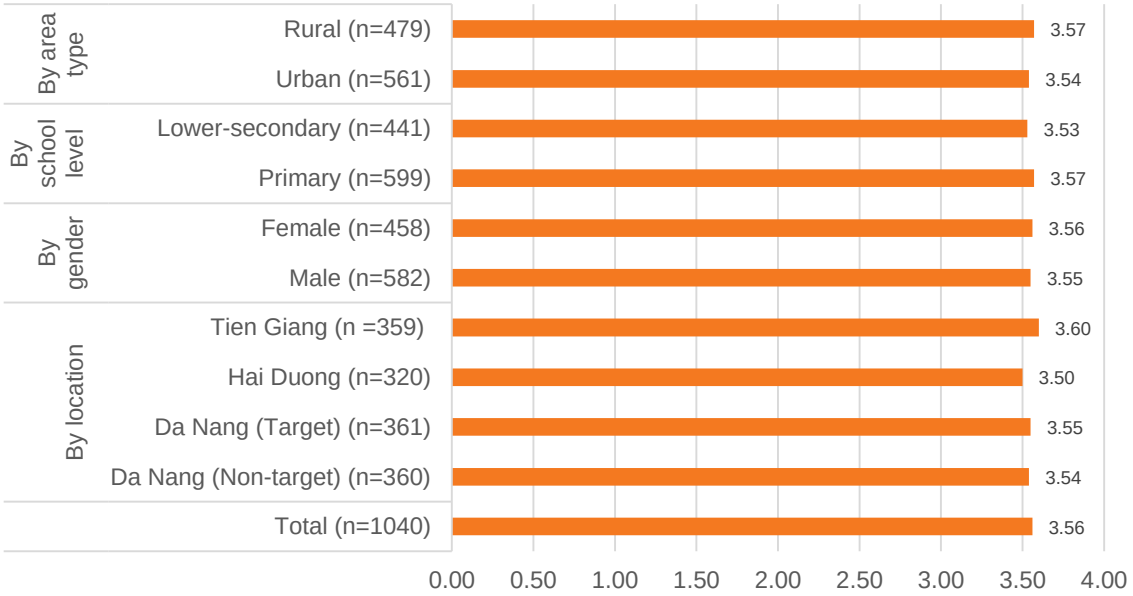
Regarding access to information, TV, the internet and public sessions at school were the three most cited sources for teachers to access information about eye diseases and refractive error. Posters at school and colleagues are also commonly mentioned by teachers and nurses as their source of information.

3.4. Attitudes toward Spectacles Wearing

Students

In general, students had positive attitudes toward spectacles wearing with an average score of 3.60 (the scale is within the range of 1 to 5). Among three target provinces, students in Hai Duong (3.50) had slightly less positive attitudes than those in the target areas in Da Nang (3.55) and Tien Giang (3.60). There was an insignificant difference between male and female students. Meanwhile, primary students and rural students had slightly higher scores compared to those of students in lower-secondary and urban schools respectively (Chart 3.4.1).

Chart 3.4.1. Students' attitudes toward spectacles wearing by categories

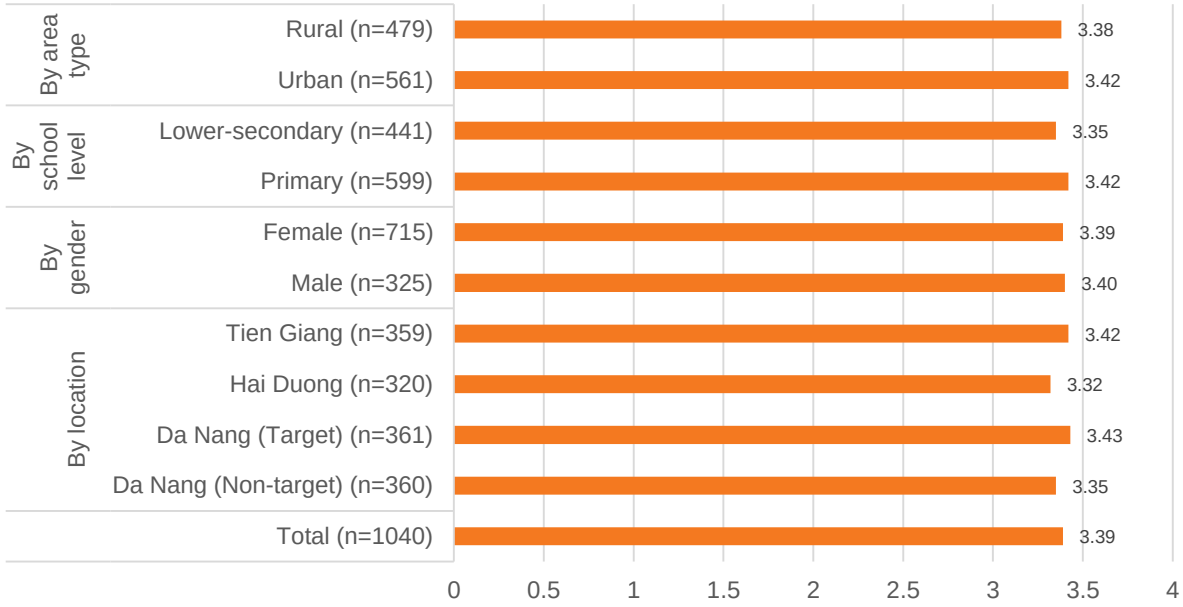


Parents

Parents achieved an average score of 3.39, which is slightly lower than that of students. Positive attitudes toward spectacles wearing were highly present among parents although there still exist negative attitudes in this regard. Parents in Hai Duong (3.32) were more negative than those in Da Nang (3.43) and Tien Giang (3.42) (Chart 3.4.2). The negative attitudes of parents in Hai Duong were further supported by the case interview in Hai Duong, where the parents' attitudes led to a wrong practice regarding their children's eye care (Box 3.4.1). Parents of primary school children and those of lower-secondary students

demonstrated differences in their attitudes toward glasses. The former group had a significantly higher score compared to the latter group. It is also observed that rural parents are more negative than urban parents in this matter.

Chart 3.4.2. Parents' attitudes toward spectacles wearing by categories



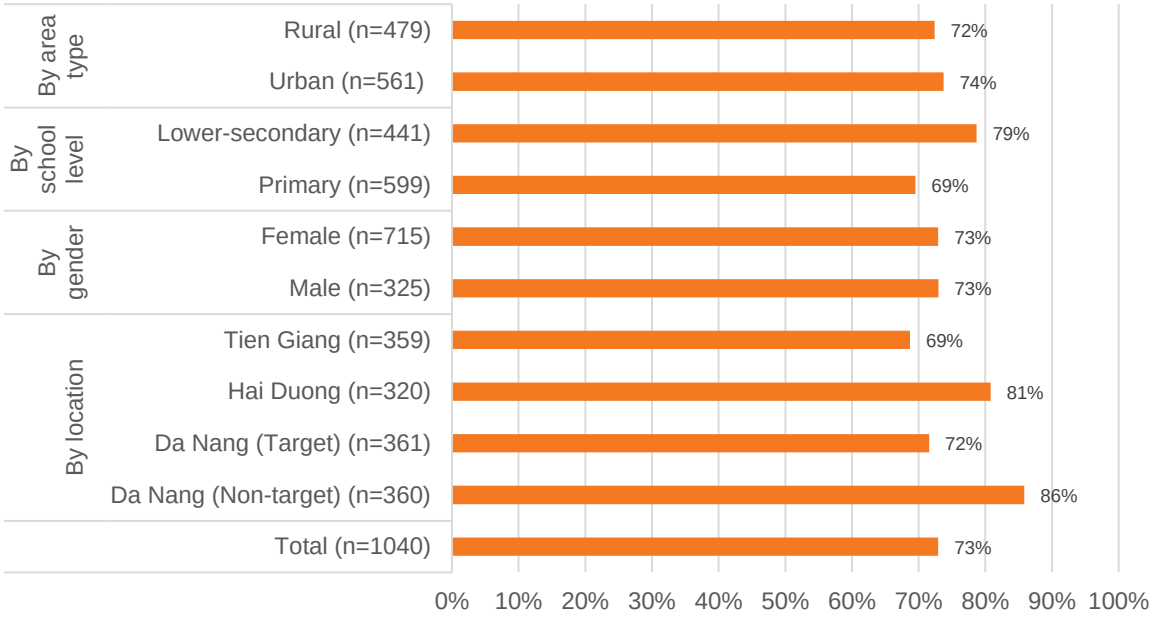
Box 3.4.1. A qualitative interview of a parent about attitude toward wearing glasses

> "*I know my kid got short-sighted but I don't want him to wear glasses. He is still too little. The glasses will just worsen his eyes' condition. I prefer natural therapy*"
>
> A parent in Hai Duong

Negative thoughts regarding glasses wearing among parents were also highlighted in qualitative interview and focus-group discussions. Parents pointed out the common stereotypes and words that their children received when being teased, such as "blind", "four eyes", "nerd" and "wearing the bottoms of the glass bottles". The existence of negative thoughts toward spectacles wearing among parents is similar to the results of a KAP study on eye health conducted in Nigeria (Ebeigbe, J.A., Kio, F., and Okafor, L.I. , 2013). In this study, some of the negative beliefs are popular, including "eye glasses are harmful to the eyes", "people who wore glasses is considered as visually handicapped", "people with glasses often get teased" and "eye glasses are only for old people".

Most parents would follow ophthalmologists' advice and let their children wear their glasses all the time if they are prescribed to. However, still a quarter of them would not do that. Parents in Hai Duong (80.87%) are more likely to follow doctors' advices than parents in Da Nang (71.55%) and Tien Giang (68.67%). The reluctance is stronger among parents of primary students compared to those of students in lower-secondary schools (30.5% vs. 21.3%) (Chart 3.4.3.). Nevertheless, in this study, significantly more parents would follow doctors' prescription on glasses wearing compared to the study conducted in Nigeria where "half (50%) believed they would wear spectacles if prescribed with one by their doctor" (Ebeigbe, J.A., Kio, F., and Okafor, L.I. , 2013).

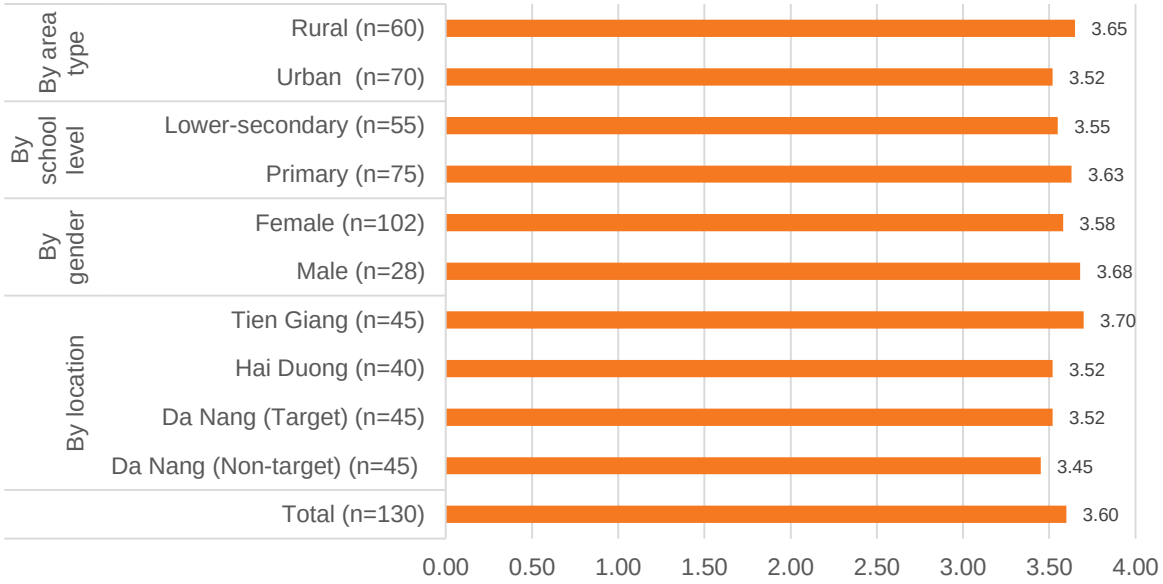
Chart 3.4.3. Proportion of parents who would follow doctor's advice for letting their child wear glasses



Teachers and school nurses

In general, school staff have positive attitudes toward spectacles wearing although some negative perceptions remained. School staff's average attitude score is 3.60, which is quite similar to students'. School staff in Tien Giang possess a significantly higher score (3.70) compared to those in Da Nang and Tien Giang, both of whom scored 3.52. Male teachers and nurses are more positive when it comes to glass wearing than females (3.68 compared to 3.58). School staff in primary and rural schools are respectively more positive than those in lower-secondary and urban schools (Chart 3.4.4).

Chart 3.4.4. Teachers and nurses' attitudes toward spectacles wearing



3.5. Eye Care Practice

Students

"Keeping a moderate distance" and "not looking at a person with pink eye" are the two most common prevention methods that students cited for avoiding infection of pink eye (Table 3.5.1). These findings indicate that incorrect preventive methods for pink eye remain prevalent among students. Moreover, a significant proportion of students were not able to mention a single preventive method for pink eye. This suggests that students must be trained in better practices regarding pink eye prevention and on other general infectious eye diseases.

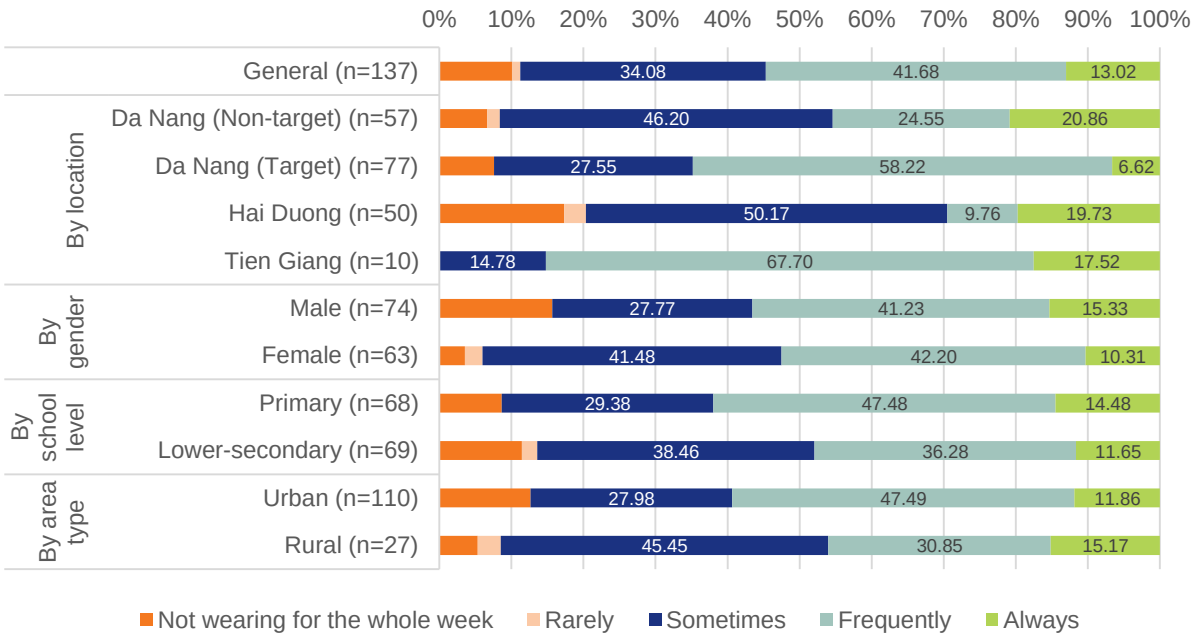
Table 3.5.1. Students: Preventive methods to avoid infection when coming into contact with a person with pink eye

	Keep a moderate distance (%)	Avoid looking into their eyes (%)	Other (%)	Don't know (%)
Total (n=1040)	40.98	44.12	17.82	12.25
By province				
Da Nang (Target) (n=361)	35.41	65.25	15.85	6.02
Hai Duong (n=320)	41.75	51.60	17.13	4.99
Tien Giang (n=359)	44.17	25.18	19.58	21.16
By gender				
Male (n=582)	38.48	43.64	19.20	13.06
Female (n=458)	44.19	44.73	16.05	11.21
By school level				
Primary (n=599)	44.79	35.14	17.06	15.85
Lower-secondary (n=441)	34.65	59.06	19.07	6.25
By area type				
Urban (n=561)	36.57	59.59	17.37	5.83
Rural (n=479)	44.13	33.08	18.14	16.83

Among the students interviewed (1,040 students), 11% of them reported that they were prescribed to wearing spectacles for treatment of RE (equivalent to 137 students). Primary students were found to be significantly less advised to wear spectacles compared to lower-secondary students (8% versus 15%). Similarly, less rural students were found prescribed with spectacles for refractive error compared to urban students (6% and 17% respectively).

Among students with such prescriptions, compliance by wearing spectacles is very poor (Chart 3.5.1). Only a half of them were found to be wearing spectacles by prescription either regularly or always, while around 10% of them were found not wearing spectacles by prescription at all for a whole week. Around two-third of students in Da Nang and Tien Giang were found wearing spectacles by prescription significantly more regularly compared to students in Hai Duong. Male students are less compliant than female students (16% versus 4% on "not wearing glasses for whole week").

Chart 3.5.1. Students' frequency of wearing spectacles in the past week



The main occasions for wearing glasses are studying (99% in Hai Duong and Tien Giang vs 68.80% in Da Nang) and watching electronic devices (43.71%). In Tien Giang, 84.69% of the students said they wore their glasses for reading, which is 2.5 times higher than the figures in the two other provinces. Interestingly, students in rural areas mentioned studying as an occasion for wearing glasses significantly more frequently than in urban areas (98.33% versus 73.41%).

Table 3.5.2. Reasons for not wearing glasses among students with prescribed glasses

Reasons for not wearing glasses among students with prescribed glasses	Inconvenient, cumbersome	Found it unnecessary to wear	Feeling unconfident while wearing spectacles	Told by parents not to wear spectacles	Wearing spectacles harms the eyes	Forgot to wear
Total (n=116)	33.93	29.38	4.63	8.08	7.38	5.11
By province						
Da Nang (Non-target) (n=45)	36.21	49.04	5.20	14.69	8.21	12.42
Da Nang (Target) (n=71)	39.51	23.38	1.10	8.36	14.07	0.00
Hai Duong (n=37)	23.21	32.68	10.89	10.85	0.00	13.19
Tien Giang (n=8)	39.35	44.30	2.52	0.00	0.00	4.54
By gender						
Male (n=61)	37.00	33.73	7.71	8.58	7.32	2.29
Female (n=55)	30.54	24.56	1.21	7.52	7.43	7.46
By school level						
Primary (n=55)	32.34	30.74	1.12	6.88	5.58	0.76
Lower-secondary (n=61)	35.37	28.14	7.79	9.15	8.99	9.03
By area type						
Urban (n=93)	33.37	23.01	0.87	7.86	11.18	0.55
Rural (n=23)	35.02	41.71	11.90	8.50	0.00	13.95

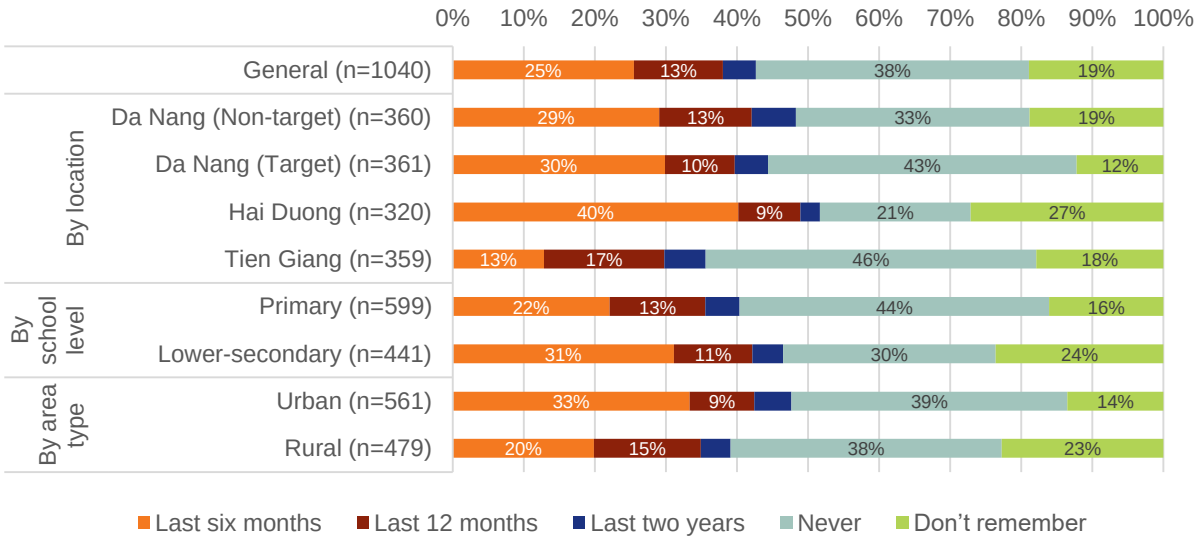
The main reasons for not wearing glasses are similar among provinces (Table 3.5.2). Eyeglasses were usually reported to be unnecessary (29.38%) and/or inconvenient (33.93%) by those who chose not to wear them. Only a small percentage of students mentioned "glasses are harmful for the eyes", which a negative perception leading to wrong practice. In the non-target group, as compared to the target group,

significantly more students mentioned glasses as being unnecessary. Meanwhile in urban areas, as compared to rural ones, a significantly larger proportion of students thought glasses were harmful for the eyes (11.18% versus 0.00%). The result also indicates that there is no difference between male and female students regarding the reasons for not wearing glasses.

Parents

Parents' eye care practices for their children and themselves are in general very poor. They tend not to consider eye issues as a problem unless they (and their children) no longer have clear enough eye visions to see properly. The lack of knowledge regarding refractive error symptoms may have induced these parents to underestimate the importance of eye care. For instance, the majority of parents who have been advised to wear glasses have not followed those advices because they themselves consider their vision to be sufficiently clear. Almost 40% of the parents never brought their child for eye check-ups in the past two years. Nearly half of the parents in Da Nang (target areas) and Tien Giang never had their child's eyes checked in the past two years, while this figure in Hai Duong was much lower (21%). This rather poor practice was found relatively more prevalent among parents of younger students (43.53% of primary students and 30% of lower-secondary students). Urban parents showed better practices compared to rural parents, given that 33% of urban students have had their eyes checked in the last six months compared to 20% of rural students (Chart 3.5.2). The poor practices of parent toward their children are also evident in a case interview in Cai Lay district of Tien Giang province, as cited in Box 3.5.1.

Chart 3.5.2. The last time parents had their child's eyes checked by medical personnel or eye specialists



Box 3.5.1. A qualitative interview with a parent in Cai Lay – Tien Giang

"I knew my son had poor vision earlier this year (four months ago) as he told me he could not clearly see the words written on the board in the class. Both my husband and I have been too busy to bring him to doctors, he has not yet been checked by doctors […]"

The mother of a grade-7 student in Cai Lay – Tien Giang

"I have one myopic eye of 0.5 diopters and the other eye of 5 diopters. I can't remember exactly which eye is more severe. I got myopic since the 1st grade. At that time, I could not see clearly the letter on the board. My parents took me to the doctor and one eye was myopic at 2 diopters, but my parents did not buy me glasses. Until when I was in the 3rd grade, the eye got more severe at 3 diopters. Then, my parents bought me glasses""

A student at the 4th grade in Hai Duong

Regular child eye care practices by parents remain inadequate. Only 6% of the parents reported that they had brought their child for a six-month periodical eye check session, which is a standard practice recommended by ophthalmologist. Less than a quarter of parents often supplement their children with vitamin A. Monitoring the time spent on using electronic devices and watching TV is the most popular practice among parents (55%). Even basic practices, such as of supplying the child with his/her own washcloth, is very low with around 8% of parents with this practice. Urban parents have overall better practices compared to rural parents (Table 3.5.3).

Table 3.5.3. Parents' regular practices to care for their children's eyes

What do you often do to take care of your child's eyes?	Remind the child not to watch TV for a long time (%)	Remind the child to turn on light when studying (%)	Take vitamin A/eat food rich in vitamin A (%)	Provide the child his/her own wash cloth (%)	Regular eye check-up (once every 6 months) (%)
Da Nang (Non-target) (n= 360)	54.88	35.44	24.4	10.82	3.7
Total (n=1040)	54.78	25.1	22.24	7.92	5.64
By province					
Da Nang target (n=361)	74.21	32.51	37.75	7.8	9.65
Hai Duong (n=320)	38.44	24.01	19.6	6.34	3.63
Tien Giang (n=359)	52.7	20.9	13.72	9.04	4.31
By school level					
Primary (n=599)	60.48	26.37	22.78	9.88	5.44
Lower-secondary (n=441)	45.29	22.97	21.36	4.66	5.98
By area type					
Urban (n=561)	66.72	32.68	33.03	6.39	7.1
Rural (n=479)	46.27	19.69	14.56	9.01	4.6

The poor practices and inadequate eye care of parents toward their children are further backed up by a qualitative case study in Da Nang. Only few parents were found well-informed enough by teachers or school nurses on their child's eye conditions, and particularly RE. Therefore, they are not serious about correcting their children's RE (Box 3.5.2).

Box 3.5.2. Qualitative interview with a school nurse in Da Nang

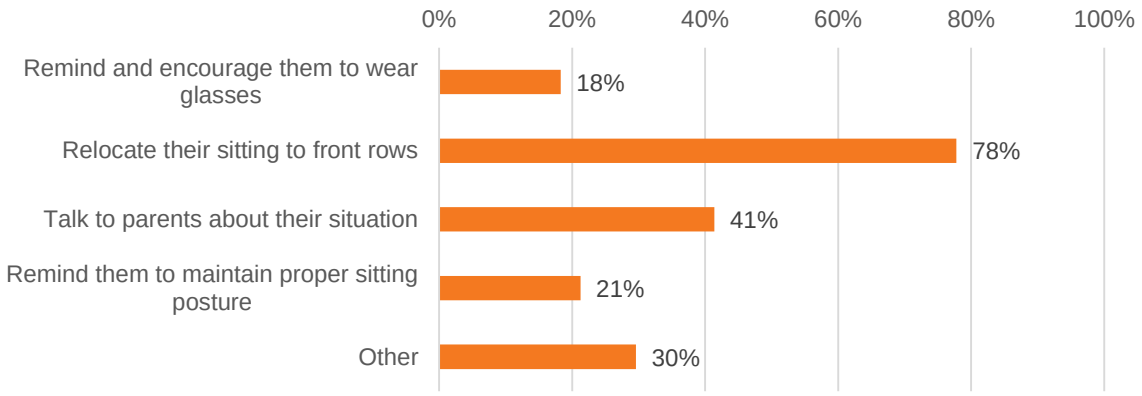
> "Last year, there are a few students identified as having untreated refractive errors during the school health check. All parents of those students were notified with the results of their students, and advised to have further examinations as to properly correct for their children's eye conditions. However, two parents did nothing to correct for their children's refractive errors."
>
> *In-depth interview with a school nurse in Da Nang*

Teachers and school nurses

Teachers' eye care practices are relatively more adequate than parents and students. If teachers were identified with pink eye, most of them would choose to wear glasses and teach normally, at the same time as limiting contact with others and reminding them to wash their hands after contact. Also, keeping a moderate distance and avoiding looking at someone's eyes were found to be the two most common ways for teachers to approach someone in front of them with pink eye.

Teachers are quite attentive about eye care practices for their students. Almost all teachers are able to properly report about RE of students in their homeroom class. More than half of the teachers would reportedly contact a student's parents if he/she was found with abnormal eyes conditions. Besides, three quarters of the teachers would reallocate students with refractive error to the front-most rows, and nearly half of them would discuss further with the parents about a student's eye conditions. However, fewer than a fifth of the teachers would remind their students to wear glasses (Chart 3.5.3).

Chart 3.5.3. Teachers' regular response toward students having RE



Findings from qualitative interviews with school nurses reveal that involvement of school nurse in eye care practice in school is rather limited. Although annual health check sessions are performed in most schools, school nurses rarely participate in those sessions; instead doctors from District Hospitals or Preventive Health Centres were in-charge of general health checks for students. The school nurses rather only provide with logistical support of health checks performed in school. School nurses are often responsible for performing preliminary treatments of physical accidents in school and propaganda regarding dental care. Since the school eye care projects have been implemented, some of the schools are now covering eye care issues in their propaganda agenda too. Once the school eye care projects are completed, eye care issues may afterwards face the risks of being dropped out of the agenda. It was reported that the training of communication skills for school nurses was quite useful in helping them to convey RE and eye health knowledge to students. After taking this training, the school nurses feel more confident to present their good eye health knowledge and practices during the school's assembly sessions.

It is also commonly reported during qualitative interviews that propaganda activities on health care in schools must strictly adhere to instructions from the District Office of Education and Training (Box 3.5.3). As a result, school nurses are not allowed to be creative and flexible in their communication activities, as well as are not permitted to bring up a health issue if such initiatives have not been instructed by the District Office of Education and Training. Apparently, strict adherence to the authorities' guideline of school health activities has restricted the role of school nurses in raising students' awareness of eye health in particular and of health care in general.

Box 3.5.3. Qualitative interview with a school nurse in Da Nang regarding communication activity

"…every activity implemented in school must follow the Letter of Request sent from higher authorities…the school principal will announce in the monthly school board meeting and then the activity would be implemented accordingly……"

In-depth interview with a school nurse in Da Nang

3.6. Accessibility to Eye Care Services

Overall, annual check-up at school, private clinics and eye hospitals are the three most popular locations where children take eye tests (Chart 3.6.1) However, preferences for accessing these three facilities vary significantly depending on provinces and whether the children are living in urban or rural areas. For example, 56% of children in Hai Duong take their eye tests during annual health check sessions organized by their school, while this figure is at 36% and 19% in Tien Giang and Da Nang, respectively. Almost 32% and 22% of children in urban and rural areas respectively undergo eye checks at private clinics (**Error! Reference source not found.**).

Chart 3.6.1. Preference for eye health check-up location (Total n=441)

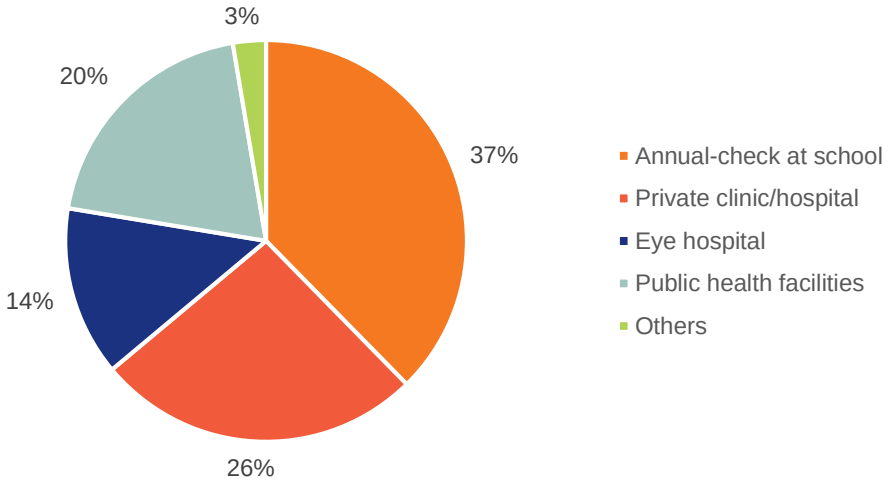


Table 3.6.1. Reasons for choosing the location of the last eye check for children

Reasons	School organizes eye-check (%)	Good reputation (%)	Valuable information/services provided by doctors (%)	Lots of equipment (%)	Reference of acquaintance (%)
General (n=441)	41.11	28.45	13.53	10.36	10.16
By province					
Da Nang (Target) (n=173)	18.73	49.83	22.18	22.2	15.33
Hai Duong (n=163)	65.29	20.21	2.57	4.75	9.96
Tien Giang (n=105)	36.41	18.72	16.9	5.98	6.09
By school level					
Primary (n=266)	32.39	29.99	17.51	11.21	10.76
Lower-secondary (n=175)	53.73	26.23	7.78	9.14	9.29
By area type					
Urban (n=274)	30.3	42.47	17.33	17.5	13.99
Rural (n=167)	50.5	16.28	10.24	4.17	6.84

There are various reasons behind the preferences for different eye check facilities. As schools organize eye health check sessions annually, the choice of undergoing eye checks at school is the most popular reason among parents. For parents identified as actively seeking to have their children's eyes examined, the reputation of a facility has an important impact on the decision-making for an average of about 20% parents in both Hai Duong and Tien Giang, and especially for parents in Da Nang (49.83%). Another important reason behind the selection of facility for eye checks among parents is the quality of the doctor's advices and other services with regards to the eye health of their children. An average of 22.18% of parents in Da Nang choose a particular facility because of the valuable information and services provided by doctors, compared with 16.9% in Tien Giang and 2.57% in Hai Duong. Moreover, 22.20% of the parents

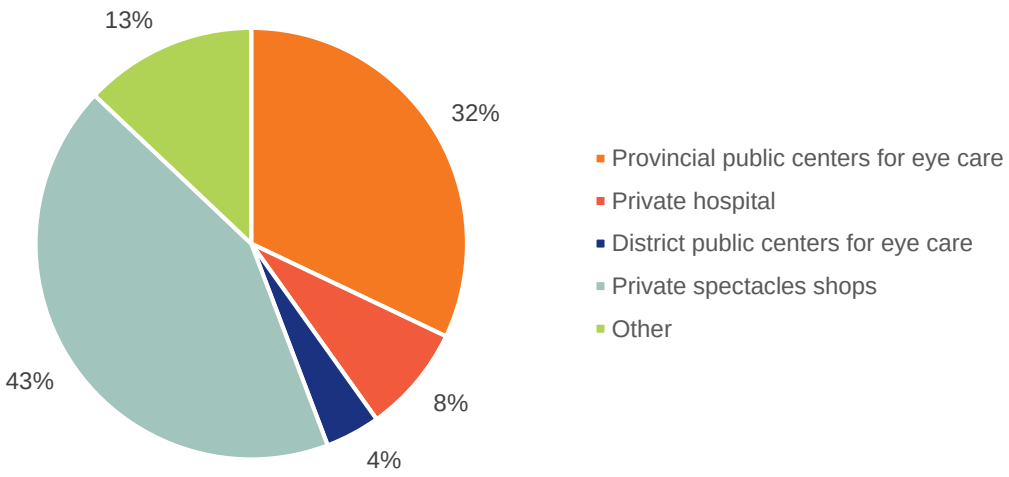
in Da Nang were found to care at least four times more than in Hai Duong and Tien Giang about the amount of equipment endowed by a particular facility. The case study from Hai Duong through in-depth interviews with parents from the province clearly supports the preference of private clinics/hospitals for eye check due to the reputation of the facility and doctors, respectively (Table 3.6.1).

Box 3.6.1. Qualitative interview with a parent about preferences toward selecting the service for their child's eye check-up

> Although Hong Chau clinic in Hai Duong City is privately-owned, it is very spacious with Hanoi doctors during the weekend. I choose this clinic for my child as I saw many patients from remote districts in Hai Duong having had their eyes checked in this clinic.
>
> *In-depth interview with a parent in Hung Thai Lower-secondary School in Hai Duong*

Regarding the accessibility to eyeglasses to correct RE, private spectacles shops are the most preferred places (43.32%). Provincial public eye care centres are the second most popular place for buying eyeglasses (32.44%), followed by private hospitals (only 8.15%). The preference for private spectacle shops is particularly of interest as at those shops, patients do not have to wait long for eye check and adjustment of glasses. Besides, private shops are open beyond the business hours, so parents find it suitable to fit the visit in their schedules (Box 3.6. 2).

Chart 3.6. 2. Preferred location for purchasing spectacles



Box 3.6. 2. Qualitative interview with a parent on preferences toward spectacles supplier

> There is no difference between the quality of glasses purchased from Cai Lay District Hospital and from private spectacle shops. I prefer buying spectacles from private shops to Cai Lay District Hospital. It would take me only a single visit to the spectacles shop plus a short waiting time. Otherwise, I would need to visit twice or wait for several hours to have a pair of glasses corrected at Cai Lay District Hospital. Besides, I can bring my child to the private spectacle shops after 5 pm, which would often be impossible at Cai Lay District Hospital.
>
> *In-depth interview with a parent in Ngu Hiep Lower-secondary School in Cai Lay – Tien Giang*

3.7. Factors Affecting Students' KAP on RE and Eye Health

Results

Regression results explicitly indicate that the independent variables have divergent impacts on the knowledge of students between primary and lower-secondary levels. The model's results can be found in the appendix "*Tables for factors affecting the KAP of students"*. Table 3.7.1 summarises the determinants which affect the knowledge of students regarding RE and eye health. Apparently, students' characteristics are the most important factors contributing to the knowledge score of students regarding RE and eye health. School characteristics and family endowment factors respectively come in the second and the third places according to level of importance.

Regarding primary students, correct recall of communication materials, age of student and knowledge of parent on RE and eye health are positively associated with students' knowledge. Primary students from target schools who correctly recalled the messages from communication materials score an extra score of 18% compared to those who failed to recall or recalled incorrectly the messages. Students who are one year older are more likely to possess better knowledge (6.6% higher score). Students whose parents scored an additional point of knowledge would gain an extra 1.5% of the average score (Table 3.7.1).

With regard to lower-secondary students, seven factors have been identified to be imposing impacts on students' knowledge scores. Female students are more likely to possess better knowledge than male students (8% higher). Students who correctly recalled the communication materials also scored an additional 10.8% of knowledge. Students with a higher score in attitudes toward spectacle wearing are able to achieve an extra 9% of knowledge score. Family endowments, including knowledge of parents on RE and eye health; and educational achievement of parent, have positive contributions to the knowledge score of students, at respectively 1.4% and 2.5%. An extra level of education attained by parents is translated to a 2.5% improvement in their lower-secondary school children's knowledge score. Students whose homeroom teacher is female are more likely to have better knowledge (8% higher) than those whose homeroom teacher is male. Finally, lower-secondary students who belong to classes with smaller size are more likely to perform better than those in larger classes (one more student in the class may lead to a 0.7% decrease in students' knowledge score) (Table 3.7.1).

Table 3.7.1. Summary of the determinants affecting the knowledge score of students regarding RE and eye health

Groups	Determinants	Magnitude of impact on students' knowledge score	
		Primary	Lower-secondary
Students' characteristics	Gender of student (being female)		0.547/6.81=8% (+)
	Correct recall of communication materials	0.938/5.25=18% (+)	0.733/6.81=10.8% (+)
	Age of student (one year older)	0.347/5.25 = 6.6% (+)	
	Attitude of students toward spectacles wearing (an extra score)		0.616/6.81 = 9% (+)
Family endowment	Knowledge of parents on eye health and eye care (an extra score)	0.0798/5.25=1.5% (+)	0.0973/6.81=1.4% (+)
	Education of the parent (a higher level of educational achievement)		0.172/6.81=2.5% (+)
School characteristics	Gender of homeroom teacher (being female)		0.55/6.81 = 8% (+)
	Class size (an extra student)		0.0469/6.81 = 0.7% (-)

(+) indicating an increase of x% of the average score in students' knowledge

(-) indicating a decrease of x% of the average score in students' knowledge

Blank cells indicate no statistically significant impact on students' knowledge.

Discussion

Correctly recalling key messages from The Foundation's communication materials is the most striking factor accelerating students' knowledge on RE and eye health in both primary and lower-secondary students. This result essentially suggests that the key messages of communication materials on RE and eye health is very effective in raising the awareness of students on RE and eye health. The communication materials demonstrate a greater magnitude of impact among students in primary schools compared to those in lower-secondary schools. This fact may indicate that the design of communication materials could be more eye-catching to students in primary schools than to those in lower-secondary schools.

For primary students, age matters in determining their knowledge. Although students in targeted primary schools were exposed to the same communication materials regarding RE and eye health knowledge (i.e. spreading knowledge on eye care during school assembly session and poster hanged up at school), on average students in grade 3 have less knowledge than grade 4 students. This implies that the materials regarding RE and eye health knowledge might be too difficult for grade-3 students. Therefore, a separate set of materials should be designed for the 3rd and the 4th grade students.

Regarding lower-secondary students, female students have better knowledge about eye health than their male counterparts. Similarly, female homeroom teachers are more likely to increase the knowledge score of their students than the male homeroom teachers. The results confirm that although family endowments like parents' knowledge and parents' education have impacts on their children's scores in eye health knowledge, the magnitude of the impact is relatively small.

In short, focus on propaganda activity would be the most priority of intervention for accelerating the students' knowledge on eye health and RE.

3.8. Limitations

This baseline study has some limitations. First is the disagreement of the parents with the use of dilating eye drops in visual acuity assessment. Second is the waiting time between the teacher's assessment and doctor's follow-up examination. Third is the fact that communication activities have already been carried out in the project's area in Hai Duong, Da Nang and Tien Giang.

Specifically, ophthalmologists are unable to conduct the eye examinations thoroughly as permission has not been granted by parents for the use of dilating eye drops on the children, although the research team has tried to convince them. However, as the safety of the children and the cooperation of the parents are highly valued by the research team, the research's design has been modified to remove this component. The children identified as having visual issues by teachers and confirmed by ophthalmologists have therefore been referred to local hospitals for further examination. This has in turn made this study unable to analyse in more detailed indicators for various forms of RE.

In addition, visual acuity screenings performed by school staff and doctors take place in separate days for most schools. This may lead to inconsistencies in the evaluation of students' visual acuity between two days of screening, especially when the eyes of children possess great adjustment capacity during school age.

Furthermore, because the School Eye Health projects (VNCEC and BEBE) have already implemented a number of dissemination campaigns about refractive error and eye care, and organised eye check sessions in a number of targeted schools prior to the preliminary research on knowledge, attitude and practices, the preliminary research results may be contaminated and overestimate the findings on knowledge, attitude and practices of students, which would then underestimate the impact measure of the School Eye Health projects in the end-line survey.

3.9. Implications

From the findings discussed above, the following points can be suggested with regards to policy implications in terms of three aspects, namely (1) strengthening the screening capacity of school staff, (2) increasing the dissemination of information to all stakeholders, and (3) diversifying current information dissemination channels.

The proportion of reported cases of untreated vision problems and the uneven distribution of RE between provinces indicate that the allocation of resources for spectacles provision should mainly be based on these characteristics. Moreover, the proportion of students with untreated refractive error remains high, suggesting for the need of more appropriate interventions in helping children to strengthen their eye visions for living and studying purposes. For example, efforts should me made toward raising greater awareness among parents, performing eye checks for children on a more regular basis, and distributing spectacles free of charge.

In the context of parents possessing rather abysmal knowledge, attitudes and practices regarding child eye health, as well as the school being the only opportunity for many students to have their eyes examined by a health professional, the visual acuity screening capacity of teachers and school nurses should be enhanced in order to detect RE more quickly and treat them appropriately. Thus, visual acuity screenings in schools, if implemented, should focus on skills and in-depth practice training for school staff. Furthermore, the quantity of teachers performing screenings should be more increased in urban schools than those in rural schools, due to their higher proportion of poor vision among students and lower levels of screening accuracy. If possible, the time frame of school screenings should be expanded in order to mitigate errors and avoid rushing the teachers in their conduct. If teachers happen to leave out any student, it will be at the great disadvantage for any missed student. Meanwhile, if the teachers refer too many students to the ophthalmologists, it will lead to inefficient distribution of tasks and unsatisfactory results.

For the knowledge dissemination aspect of the project, the study shows that the project is doing well in communicating the concepts of refractive error, especially during comparisons between target and non-target areas. The study partly also finds that the target subjects for research have begun developing basic and correct viewpoints on various forms of RE and preventive methods. However, the information disseminated should cover a wider range of other important eye care practices that school students and parents are relatively less aware about, such as outdoor exercise, nutritional provision, and the appropriate distance from which they should watch TV. Parents should be more able to access information through the mass media. In addition, information about other RE, especially astigmatism, should be more disseminated to students and parents.

For students, the study shows that the major source of information on eye care is found at school (during meeting sessions, flyers, posters, etc.). Schools are also the most appropriate locations for the project to promote interventions. However, parents are rarely exposed to information at school apart from the regular parent’s meeting. Hence information should also be disseminated through the media such as books and newspapers, television, and internet. A focus on good knowledge, attitudes and practices on refractive error and eye care for parents plays a critical role in improving the eye care knowledge and practices among primary school students.

Teachers and school nurses also play a very important role, as they are the ones who officially and regularly convey knowledge to students. Although teachers generally possess greater knowledge than parents, they still need to be equipped further with in-depth knowledge on eye care, including on more specific symptoms of RE and other common eye diseases, as well as their causes, preventions, and adjustments. In addition, misconceptions such as "avoiding eye contact with pink eye to prevent infection" should be eliminated. Also, a focus on knowledge, attitudes and practices on refractive error and eye care for female teachers at lower-secondary schools can increase the sustainability of the project in terms of knowledge, attitudes and practices among students from generation to generation.

Teaching materials on knowledge, attitudes and practices regarding refractive error and eye care should be integrated in life skills lessons of the study curriculum. At the same time, instructional materials should be suited for the student's age and grade level to achieve the best results. For primary schools, there

should be at least 2 textbooks for students in the upper and lower classes. For lower-secondary schools, a document could be shared across all the grades.

3.10. Further Research

Due to limitations from the fact that doctors have not been allowed to using dilating eye drops on students during screening, efforts toward determining the prevalence of each form of refractive error among students (myopia, astigmatism or both) have not been successfully carried out. Therefore, an in-depth study that allows for a more thorough visual acuity screening in identifying the most widespread forms of RE among children in the age group of 6-15 should be carried in the near future.

Besides, a significant difference is found in terms of knowledge on refractive error and eye care between primary school grades (grade 3 compared to grade 4 in this study). Therefore, The Foundation could produce more in-depth studies and publications on primary school students in order to assure that younger students are also able to understand more about refractive error. Moreover, these publications should be able to stimulate greater interest about refractive error and eye care among younger children.

IV. CONCLUSION

Prevalence of visual issues among students

The proportion of students with untreated eye problems and that of students with uncorrected refractive error are currently quite high (at respectively 18.52% and 24.64%), especially in urban areas in Da Nang and Hai Duong provinces. Among every three children with refractive errors (RE), two of them have not received appropriate correction. This indicates that efforts toward detecting school students with poor vision at school needs further investments to mitigate the current problems.

Accuracy of school staff's visual acuity screening practice

The accuracy of the visual acuity screenings performed by teachers and school nurses in the project's target area is demonstrated by a sensitivity of 60.92% and a specificity of 93.76%. This result is lower than that of some other previous studies conducted in Viet Nam and in other Asian countries. This outcome suggests that teachers and school nurses need to be trained and equipped further with better skills and knowledge in conducting screening to improve their screening performance. Schools in urban areas should have more teachers trained with visual acuity screening skills and be allocated a greater time frame for conducting screenings.

Eye care knowledge, attitudes and practices of stakeholders

With regards to students and parents, RE have not been fully understood and their eye care practices must be strengthened further, despite that these stakeholders demonstrate some levels of understanding about myopia and a large proportion of them know how to correct for this type of refractive error. Particularly, the causes and preventive methods of RE remain unclear to them. Although students and parents are relatively much more aware of myopia, they lack adequate knowledge about hyperopia, astigmatism and trachoma. Additionally, only one fourth of the parents had their child's eyes checked in the past 6 months and up to 40% of students have never had their eyes checked.

Teachers and nurses were found possessing much better knowledge than students and parents by their decent eye care practices. However, their understanding about eye issues remain incomplete and minor misconceptions persist. More specifically, a clear majority of teachers can easily name specific symptoms, treatments and preventions for myopia, hyperopia as well as symptoms and preventions for pink eye and trachoma, while astigmatism remains relatively less known among them. The teachers' most common practice is that they often arrange students with RE to sit closer to the front of the classroom. They also have the good practices of notifying parents about their children's visual abnormalities. Some of them, however, still think that looking into the eyes of those with pink eyes is a means of transmission of this disease. From the position of having frequent exchanges of contact with students and directly conveying knowledge to them, the teachers should improve their understanding of eye care and defy misconceptions.

Students, teachers and nurses generally have a good attitude towards wearing glasses and other people who wear glasses. However, there is some trends of a negative attitude held among the parents when it comes to these issues. To be specific, a large proportion of the parents still believe that wearing glasses can harm the eyes and negatively affect one's physical appearance. Only a minor proportion of students and school staff hold similar negative views.

Spectacles are not yet well-integrated in the stakeholders' life and compliance with spectacles wear remains an issue. Despite their good attitudes, among those prescribed with spectacles wear, only just above half of the students wore their eye glasses regularly, and about one tenth did not wear their glasses at all in the past week. Students who do not wear their prescribed glasses argue that it is unnecessary or inconvenient, and parents who do not wear their prescribed glasses argue that they can still see clearly.

Rural students have weaker performance in knowledge about eye health than urban students. In addition to this, Tien Giang students performed on average worse than Hai Duong and Da Nang, suggesting that extra efforts should be invested in Tien Giang. Additionally, students and parents in Da Nang's target areas performed on average better than those in Da Nang's non-target areas, which might be explained by the fact that targeted groups enjoy better access to information about eye care, diseases and prevention.

Differences between male and female are modest across the whole sample, apart from observations among lower-secondary schools, where female students were found to have slightly stronger performance in terms of knowledge on eye care than male students. This may be attributed to by the possibility that students at primary schools and lower secondary schools are of different nature, and thus should be studied separately when it comes to knowledge, attitudes and practices and approached differently during the interventions. Besides, with regards to the parents' gender, most differences are insignificant, but male parents have slightly better access to information on eye care than females.

Access to information

Different parties access information from different channels. As students have their access to information regarding eye care at school mainly, the parents on the other hand tend to access information from the media and people around them. The main source of information for all stakeholders about eye care, diseases and prevention is the TV. However, schools, especially assembly sessions and school posters, also plays a key role for students, while the parents rely more on the internet as well as their friends and relatives.

Factors affecting students' knowledge

Notable differences are observed in terms of the factors affecting students' knowledge between primary and secondary school students. Students' exposure to the Foundation's communication materials largely contributed to their scores of knowledge on RE and eye health; however, the impact is higher among primary school children than lower-secondary students. Although parents' knowledge on RE and eye health is positively correlated to students' knowledge, the magnitude of the impact is relatively small. Additionally, improving lower-secondary students' attitudes toward spectacles wearing would raise their knowledge. With regards to lower-secondary students, female students and students having female homeroom teacher would be more likely to gain extra scores in their knowledge on RE and eye health.

Policy implications

The following points regarding strengthening screening capacity, increasing information dissemination activities, and diversifying current information dissemination channels can be considered in the design of the School Eye health projects and/or policy advocacy efforts:

- The capacity of school nurses and teachers in identifying poor vision and conducting screening for early diagnosis of RE among students should be strengthened. Urban schools should have more teachers trained in conducting visual acuity screening, and should be allocated extra time for practice.
- It is necessary to integrate the screening program performed by teachers and school for early detection of RE nurses into regular school activities (screening every 6 months).
- Knowledge dissemination activities about eye care in schools should be increased, leading to improvements in the students' knowledge, attitudes and practices. Parents should however be approached more through the mass media.
- Knowledge dissemination activities about astigmatism and other eye care practices, such as outdoor activities and nutritional provision, should be increased. Semi-annual eye checks among parents, students and teachers should be more encouraged.
- The school eye care project should develop a list of misconceptions related to preventions and adjustments for RE and explain them thoroughly to parents, students and teachers.
- Teaching materials on knowledge, attitudes and practices regarding refractive error and eye care should be integrated in life skills lessons of the study curriculum. At the same time, instructional materials should be suited for the student's age and grade level to achieve the best results. For primary schools, there should be at least two curricula for students in the upper and lower classes. For lower-secondary schools, one teaching curriculum could be shared across all the grades.

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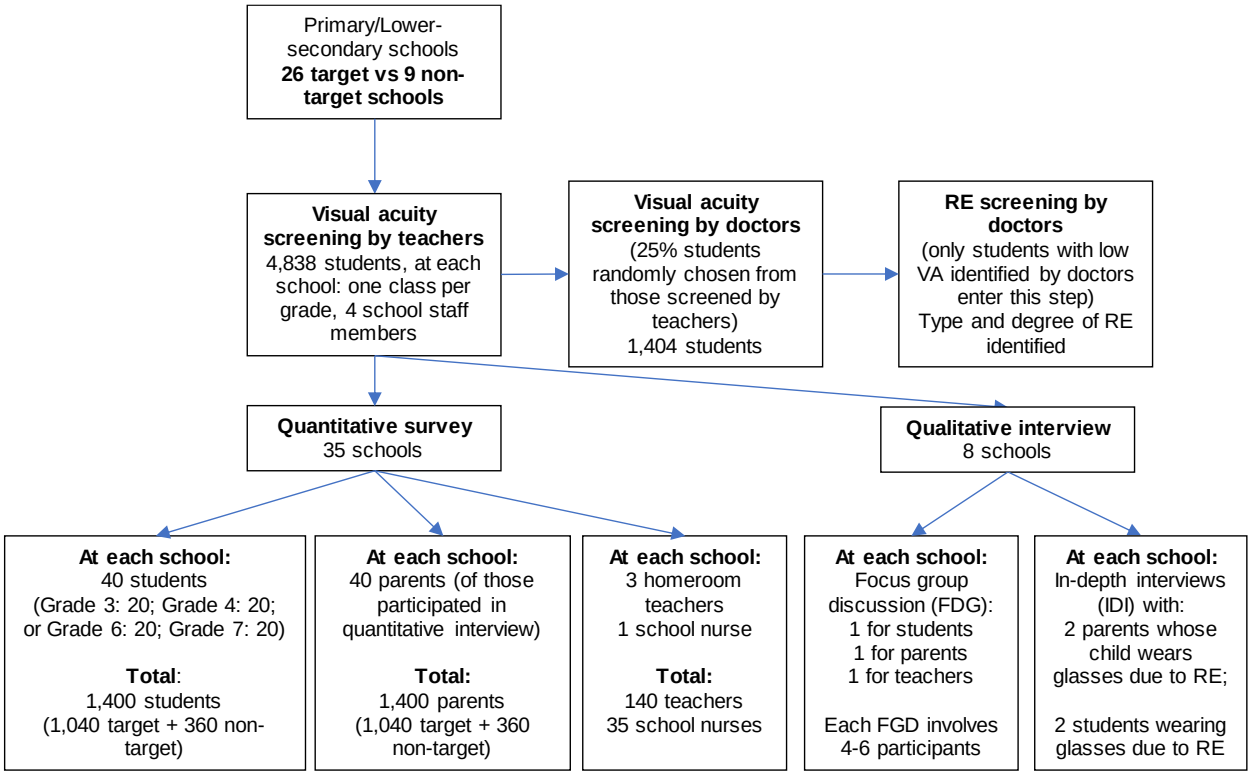
ADDITIONAL RESOURCES

Appendix 1. Terminology

Term	Definition
Refractive errors	Refractive error means that the shape of your eye does not bend light correctly, resulting in a blurred image. The main types of refractive errors are myopia, hyperopia, presbyopia (loss of near vision with age), and astigmatism.
Myopia	(Short-sightedness) Far objects appear blurred.
Hyperopia	(Far-sightedness) Near objects appear blurred.
Astigmatism	Distorted images due by a deviation from spherical curvature. Light rays are prevented from meeting at a common focus.
Trachoma	Contagious bacterial infection of the eye in which there is inflamed granulation on the inner surface of the lids. Repeated infections can lead to a form of permanent blindness when the eyelids turn inwards.
Primary school	In Vietnam, according to the Education Law[6], primary schools provide compulsory education from grade 1 to grade 5.
Lower-secondary school	In Vietnam, according to the Education Law, lower-secondary schools provide education from grade 6 to grade 9.
Homeroom teacher	A homeroom teacher is the teacher who is in charge of a class of students. She/he is responsible for all administrative tasks of the class. In addition, she/he is usually also the one who teaches the main subjects (Maths, Vietnamese, Sciences, etc.) for students in that class.
Main campus	It is very common in Vietnam, especially in rural areas, that schools have a main campus where the administration headquarters are located and then small campuses composed of classrooms where only teachers, and sometimes school nurses, can be found.
School staff	In this study, this appellation covers teachers and school nurses.
Assembly session	It is common in Vietnam for schools to have “assembly session” on Monday morning where the whole school gathers in the gym hall to review the program of the previous week and to talk about the program of the following week.

[6] An English copy of the Education Law can be accessed via: http://www.moj.gov.vn/vbpq/en/lists/vn%20bn%20php%20lut/view_detail.aspx?itemid=5484

Appendix 2. Flow chart describing the research's design



Appendix 3. Ethical approval letter from the Hanoi Medical University's ERB

(The letter is in Vietnamese)

BỘ Y TẾ
TRƯỜNG ĐẠI HỌC Y HÀ NỘI

Số: ..57.../HĐĐĐĐHYHN
Vv: Chấp thuận ĐĐNCYSH

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

Hà Nội, ngày 18 tháng 01 năm 2017

CHỨNG NHẬN CHẤP THUẬN CỦA HỘI ĐỒNG ĐẠO ĐỨC TRONG NGHIÊN CỨU Y SINH HỌC

Căn cứ Quyết định số 1722/QĐ-ĐHYHN, ngày 20 tháng 5 năm 2014 của Hiệu trưởng Trường Đại học Y Hà Nội về việc thành lập Hội đồng và Ban thư ký Hội đồng Đạo đức trong nghiên cứu y sinh học xét duyệt các vấn đề đạo đức trong nghiên cứu Y sinh học của các đề tài/Dự án;

Căn cứ chứng nhận thông qua hoạt động của Hội đồng Đạo đức trường Đại học Y Hà Nội, mã số IRB00003121, được cấp bởi Bộ Y tế và Dịch vụ nhân sinh Hoa Kỳ, ngày 16 tháng 6 năm 2009, được cấp lại ngày 18 tháng 02 năm 2016;

Căn cứ Quyết định số 109/QĐ – K2ĐT ngày 25 tháng 8 năm 2015 về việc cấp mã số hoạt động cho hội đồng đạo đức y sinh học cấp cơ sở của trường Đại học Y Hà Nội, mã số IRB – VN01001;

Căn cứ biên bản tổng hợp ý kiến nhận xét của Hội đồng Đạo đức trong nghiên cứu Y sinh học trường Đại học Y Hà Nội ngày 11 tháng 01 năm 2017;

Nay Hội đồng Đạo đức trong nghiên cứu Y sinh học Trường Đại học Y Hà Nội chấp thuận về các khía cạnh đạo đức trong nghiên cứu đối với đề tài:

1. Tên đề tài: Khảo sát đầu kỳ và cuối kỳ dự án chăm sóc mắt học đường

2. Cơ quan tài trợ:	Tổ chức Quốc tế về phòng chống mù lòa, kinh phí do quỹ Fred Hollows điều phối
3. Chủ nhiệm:	TS. Vũ Tuấn Anh
4. Cơ quan chủ trì đề tài :	Viện nghiên cứu phát triển Mekong
5. Địa điểm triển khai:	Hải Dương, Đà Nẵng, Tiền Giang
6. Thời gian nghiên cứu:	01/2017 – 12/2018
7. Ngày chấp thuận:	Ngày 18 tháng 01 năm 2017

ỦY VIÊN THƯỜNG TRỰC

PGS.TS. Ngô Văn Toàn

CHỦ TỊCH HỘI ĐỒNG
KT. HIỆU TRƯỞNG
PHÓ HIỆU TRƯỞNG

TRƯỜNG ĐẠI HỌC Y HÀ NỘI

GS.TS. Tạ Thành Văn

Appendix 4. Tables for factors affecting KAP of students

List of variables in the regression model

Variable	Explanation	Note
Knowledge_student	Score of all correct answers on knowledge identified by students	Continuous
Knowledge_parent	Score of all correct answers on knowledge identified by parents	Continuous
Knowledge_teacher	Score of all correct answers on knowledge identified by teachers	Continuous
Edu_parent	The highest qualification achieved by parent	Ordinal
Gender_student	Gender of student	Dummy (0 = Male; 1 = Female)
Gender_parent	Gender of parent	Dummy (0 = Male; 1 = Female)
Gender_teacher	Gender of teacher	Dummy (0 = Male; 1 = Female)
Pjob_farm	Occupational type of parent	Dummy (0 = Unemployed/ Housewife/Retired; 1 = Self-employment in farming)
Pjob_nonagribus	Occupational type of parent	Dummy (0 = Unemployed/ Housewife/Retired; 1 = Self-employment in NON-farming business)
Pjob_wage	Occupational type of parent	Dummy (0 = Unemployed/ Housewife/Retired; 1 = Wage employment)
Age_parent	Age of parent	Continuous
Age_parent_sqr	(age of parent)^2	
Urban_rural	Type of area where the school is located	Dummy (Rural = 0; Urban = 1)
Incomelogged	Average income per capita per year of the household that the child lives with	Continuous
Grade_3	Students in grade 3	Dummy (Grade 3 = 1; Grade 4 = 0)
Refractive_student	Student has REs	Dummy (Not having RE = 0; Having RE = 1)
Refractive_parent	Parent has REs	Dummy (Not having RE = 0; Having RE = 1)
Glasses_student	Student with RE and currently wearing glasses	Dummy (Not wearing glasses = 0; Wearing glasses = 1)
Glasses_parent	Parent with RE and currently wearing glasses	Dummy (Not wearing glasses = 0; Wearing glasses = 1)
hhsz	Household size: number of members currently live with the child	Continuous
Class_size	Size of student's class	Continuous
Grade_6	Students in grade 6	Dummy (Grade 6 = 1; Grade 7 = 0)
Info_exposure	Students remember the content (message) from flyers regarding eye care knowledge	Dummy (Yes = 1; No = 0)
Attitude_student	Students' score on their attitudes toward spectacles wearing	Continuous

Basic description of variables in regression models for students in primary schools

VARIABLES Primary schools	(1) N	(2) mean	(3) sd	(4) min	(5) max
attitude_student	799	3.57	0.35	0.18	4.64
age_parent	799	40.02	9.37	16.00	75.00
edu_parent	799	3.21	1.60	0.00	6.00
Info_exposure	799	0.31	0.46	0.00	1.00
knowledge_student	799	5.25	1.56	0.33	11.31
knowledge_parent	799	8.34	2.79	1.00	14.77
knowledge_teacher	788	11.96	1.43	7.62	14.98
gender_student	799	0.44	0.50	0.00	1.00
gender_parent	799	0.66	0.47	0.00	1.00
gender_teacher	788	0.82	0.39	0.00	1.00
pjob_farm	799	0.30	0.46	0.00	1.00
pjob_nonagribus	799	0.26	0.44	0.00	1.00
pjob_wage	799	0.33	0.47	0.00	1.00
age_parent_sqr	799	1,689.03	876.68	256.00	5,625.00
hhsz	799	4.62	1.27	2.00	11.00
urbanrural	799	0.46	0.50	0.00	1.00
incomelogged	798	0.70	0.71	-1.95	5.52
grade_3	799	0.50	0.50	0.00	1.00
refractive_parent	799	0.14	0.35	0.00	1.00
refractive_student	799	0.09	0.29	0.00	1.00
glasses_parent	799	0.11	0.32	0.00	1.00
glasses_student	799	0.08	0.28	0.00	1.00
class_size	799	34.30	5.98	19.00	45.00

Basic description of variables in regression models for students in lower-secondary schools

VARIABLES Lower-secondary schools	(1) N	(2) mean	(3) sd	(4) min	(5) max
attitude_student	601	3.54	0.30	2.18	4.45
age_parent	601	41.64	8.82	16.00	83.00
edu_parent	601	3.10	1.30	0.00	6.00
Info_exposure	601	0.43	0.49	0.00	1.00
knowledge_student	601	6.81	1.85	1.25	12.10
knowledge_parent	601	7.78	2.69	0.33	14.59
knowledge_teacher	594	11.58	0.81	9.53	14.02
gender_student	601	0.44	0.50	0.00	1.00
gender_parent	601	0.68	0.47	0.00	1.00
gender_teacher	594	0.84	0.37	0.00	1.00
pjob_farm	601	0.33	0.47	0.00	1.00
pjob_nonagribus	601	0.23	0.42	0.00	1.00
pjob_wage	601	0.36	0.48	0.00	1.00
age_parent_sqr	601	1,811.35	846.73	256.00	6,889.00
hhsz	601	4.51	1.13	2.00	9.00
urbanrural	601	0.38	0.49	0.00	1.00
incomelogged	600	0.47	0.64	-2.30	2.80
grade_6	601	0.49	0.50	0.00	1.00
refractive_parent	601	0.14	0.35	0.00	1.00
refractive_student	601	0.18	0.39	0.00	1.00
glasses_parent	601	0.08	0.27	0.00	1.00
glasses_student	601	0.16	0.37	0.00	1.00
class_size	601	35.78	6.28	26.00	46.00

Results from regression models

Variables	Primary				Lower-secondary			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student
	Random effect	School fixed effect	Random effect	School fixed effect	Random effect	School fixed effect	Random effect	School fixed effect
gender_student	-0.146	-0.143	-0.145	-0.142	0.583***	0.548*	0.581***	0.547*
	(0.169)	(0.174)	(0.169)	(0.177)	(0.0000356)	(0.0155)	(0.0000337)	(0.0241)
Info_exposure	0.920***	0.924***	0.932***	0.938***	0.659***	0.735**	0.664***	0.733**
	(3.29e-14)	(0.0000260)	(1.21e-14)	(0.0000249)	(0.00000368)	(0.00100)	(0.00000303)	(0.00132)
grade_3	-0.358**	-0.349**	-0.359**	-0.347**				
	(0.00124)	(0.00712)	(0.00115)	(0.00688)				
grade_6					-0.389**	-0.409	-0.421**	-0.440
					(0.00533)	(0.155)	(0.00242)	(0.139)
attitude_student	0.236	0.231	0.233	0.225	0.530*	0.597*	0.560*	0.616*
	(0.109)	(0.293)	(0.113)	(0.286)	(0.0247)	(0.0200)	(0.0173)	(0.0173)
refractive_student	0.0475	0.0378	0.0164	0.00353	0.833	0.974*	0.922*	1.064*
	(0.900)	(0.919)	(0.965)	(0.992)	(0.0752)	(0.0159)	(0.0485)	(0.0324)
glasses_student	0.428	0.443	0.422	0.441	-0.544	-0.581	-0.606	-0.650
	(0.279)	(0.226)	(0.284)	(0.225)	(0.265)	(0.0741)	(0.215)	(0.0897)
knowledge_parent	0.0852**	0.0859**	0.0788**	0.0798**	0.0775*	0.0873**	0.0882**	0.0973**
	(0.00107)	(0.00338)	(0.00228)	(0.00556)	(0.0128)	(0.00535)	(0.00448)	(0.00168)
edu_parent	0.0379	0.0351	0.0275	0.0239	0.152*	0.161*	0.166**	0.172*
	(0.455)	(0.585)	(0.568)	(0.679)	(0.0199)	(0.0175)	(0.00997)	(0.0287)
gender_parent	0.0480	0.0505			0.0953	0.119		
	(0.675)	(0.618)			(0.537)	(0.521)		

Variables	Primary				Lower-secondary			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student
	Random effect	School fixed effect	Random effect	School fixed effect	Random effect	School fixed effect	Random effect	School fixed effect
refractive_parent	0.248	0.248	0.0853	0.0838	-0.605*	-0.590*	-0.459*	-0.470
	(0.246)	(0.272)	(0.574)	(0.685)	(0.0439)	(0.0289)	(0.0458)	(0.0863)
glasses_parent	-0.295	-0.294			0.171	0.129		
	(0.204)	(0.198)			(0.609)	(0.556)		
hhsz	0.0415	0.0432			0.0410	0.0366		
	(0.318)	(0.429)			(0.511)	(0.553)		
incomelogged	0.0845	0.0844	0.0829	0.0836	0.299*	0.306	0.289*	0.279
	(0.311)	(0.667)	(0.309)	(0.657)	(0.0185)	(0.0829)	(0.0180)	(0.0723)
pjob_farm	0.445*	0.458			0.00248	0.0836		
	(0.0274)	(0.201)			(0.993)	(0.840)		
pjob_nonagribus	0.256	0.263			-0.222	-0.205		
	(0.198)	(0.288)			(0.450)	(0.611)		
pjob_wage	0.293	0.303			0.332	0.335		
	(0.140)	(0.273)			(0.243)	(0.438)		
age_parent	-0.0738	-0.0739			0.0638	0.0539		
	(0.0546)	(0.183)			(0.157)	(0.392)		
age_parent_sqr	0.000865*	0.000864			-0.000523	-0.000411		
	(0.0371)	(0.157)			(0.263)	(0.502)		
knowledge_teacher	0.0242		0.0310		0.390***		0.375***	
	(0.516)		(0.402)		(0.000330)		(0.000494)	
gender_teacher	-0.207	-0.213	-0.211	-0.220	0.0978	0.547**	0.120	0.550**
	(0.187)	(0.346)	(0.176)	(0.351)	(0.664)	(0.00407)	(0.593)	(0.00849)

Variables	Primary				Lower-secondary			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student	knowledge_student
	Random effect	School fixed effect	Random effect	School fixed effect	Random effect	School fixed effect	Random effect	School fixed effect
urbanrural	0.435**	0.434	0.325*	0.323	0.618**	0.398	0.657***	0.427
	(0.00623)	(0.132)	(0.0240)	(0.332)	(0.00142)	(0.226)	(0.000459)	(0.229)
class_size	0.00403	0.00495	0.00409	0.00515	-0.0468***	-0.0441*	-0.0486***	-0.0469*
	(0.715)	(0.744)	(0.703)	(0.736)	(0.000422)	(0.0434)	(0.000188)	(0.0439)
_cons	3.974***	4.242**	3.060***	3.426***	-1.850	2.077	0.154	3.850*
	(0.000954)	(0.00368)	(0.000133)	(0.000806)	(0.303)	(0.207)	(0.914)	(0.0115)
N	787	787	787	787	593	593	593	593
R-sq	0.195	0.194	0.183	0.182	0.267	0.250	0.250	0.234
p-values in parentheses	* p < 0.1	** p<0.01	*** p<0.001					

Appendix 5. Sample of school staff's visual acuity result form

BIỂU 1 - PHIẾU KẾT QUẢ KHÁM SÀNG LỌC THỊ LỰC THẤP

Giáo viên thực hiện khám:

Số điện thoại của giáo viên:

Lớp (GV khám):

Trường:

Phường/xã/thị trấn:

Quận/huyện:

Tỉnh:

Ngày:

Đóng dấu của trường học

STT (1)	Họ tên (2)	Giới tính (3)	Năm sinh (4)	HS đeo kính (Có/Không) (5)	Lý do đeo kính (Cận, Viễn, Loạn, Khác ghi rõ) (6)	Thị lực không kính (Vd:7//10) (7)		Thị lực có kính đang đeo (3/10) (8)		Bất thường khác (CÓ/không) (9)		Chuyển đi khám bác sỹ mắt (Có/Không) (10)
						Mắt phải (7a)	Mắt trái (7b)	Mắt phải (8a)	Mắt trái (8b)	Mắt phải (9a)	Mắt trái (9b)	
1												
2												
3												
4												
5												
6												
7												
8												
9												

Appendix 6. Sample of ophthalmologist's visual acuity result form

BIỂU 2. PHIẾU KẾT QUẢ KHÁM THỊ LỰC, TẬT KHÚC XẠ VÀ CÁC BỆNH VỀ MẮT

Bác sĩ (trưởng đoàn khám): Số điện thoại: Chữ ký trưởng đoàn

Nhân viên y tế khác của đoàn khám:

Trường: Phường/xã/thị trấn: Quận/huyện: Tỉnh:

Ngày khám: Buổi khám: Sáng/chiều

STT (1)	Họ tên (2)	Giới tính (3)	Năm sinh (4)	Lớp (4a)	HS đeo kính (Có/không) (5)	Lý do đeo kính (6)	Thị lực không kính (vd: 7/10) (7)		Thị lực có kính đang đeo (vd: 7/10) (8)		Thị lực qua kính lỗ (vd: 4/10) (9)		Mắt có bất thường khác (Có/không)		Kết luận TKX do bác sỹ khám (nếu có) (11)		Ghi chú khác (bị bệnh gì, chuyển đến khám ở đâu, vv..v) (12)
							MP (7a)	MT (7b)	MP (8a)	MT (8b)	MP (9a)	MT (9b)	MP (10a)	MT (10b)	MP (11a)	MT (11b)	
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	