SCHOOL-BASED EYE CARE PROGRAM IN YOGYAKARTA
EDUCATION, BASIC EYE EXAMINATION, AND DIGITAL MEDIA ENGAGEMENT AT STELLA DUCE 2 SENIOR HIGH SCHOOL

Loury Priskila[1], Ebenezer Devara Yeckopradana[1], Ahava Tasa Sasabone[1], Ni Kade Dian Ary Cahyani[1]

[1)] Faculty of Medicine, Universitas Kristen Duta Wacana, Special Region of Yogyakarta, Indonesia

Corresponding author email: loury@staff.ukdw.ac.id

ABSTRACT
This community service program aimed to increase awareness of eye health and facilitate early detection of refractive errors among students at Stella Duce 2 Senior High School, Yogyakarta. The activities were conducted from August 4-8, 2025, involving Grade X students as the main participants, with teachers and staff as additional targets.
The methods included interactive health education, basic eye examinations (visual acuity, ocular motility, color vision, pupillary reflex, external and internal checks), and a short video competition themed "Jaga Mata untuk Masa Depan Cerah." Results showed active student participation in education sessions, 190 individuals underwent eye screening, and several refractive errors requiring correction or referral were detected. The video competition produced creative educational content that was shared on social media, extending the program's outreach.
In conclusion, the program improved eye health awareness, enabled early detection of vision problems, and encouraged digital health promotion. This model can be replicated in other schools to strengthen promotive and preventive eye care.

Keywords: eye health, refractive errors, eye screening, community service, adolescent

ABSTRAK
Program pengabdian masyarakat ini bertujuan untuk meningkatkan kesadaran kesehatan mata serta mendukung deteksi dini gangguan refraksi di SMA Stella Duce 2 Yogyakarta. Kegiatan dilaksanakan pada 4-8 Agustus 2025 dengan melibatkan siswa kelas X sebagai peserta utama, serta guru dan karyawan sebagai sasaran tambahan.
Metode yang digunakan meliputi edukasi kesehatan interaktif, pemeriksaan mata dasar (ketajaman visual, gerakan bola mata, buta warna, refleks pupil, serta pemeriksaan eksternal dan internal), dan kompetisi video pendek bertema "Jaga Mata untuk Masa Depan Cerah."
Hasil menunjukkan partisipasi aktif siswa dalam sesi edukasi, 190 individu menjalani pemeriksaan mata, dan ditemukan beberapa kasus gangguan refraksi yang memerlukan koreksi atau rujukan. Kompetisi video menghasilkan konten edukatif yang dipublikasikan melalui media sosial sehingga memperluas jangkauan pesan kesehatan.
Kesimpulannya, kegiatan ini berhasil meningkatkan kesadaran siswa, mendukung deteksi dini, dan mendorong promosi kesehatan melalui media digital. Model ini dapat direplikasi di sekolah lain untuk memperkuat upaya promotif dan preventif.

Kata kunci: *kesehatan mata, gangguan refraksi, pemeriksaan mata, pengabdian masyarakat, remaja*

INTRODUCTION

Eye health is essential as the "window of life" in supporting daily activities and facilitating the learning process, particularly among school-aged children. With technological advancement, almost all age groups now spend significant time on digital screens, which increases the risk of eye problems, especially refractive errors.[1] In Jakarta, the prevalence of myopia after the COVID-19 pandemic reached 21.1%, suggesting that excessive screen time and reduced outdoor activity exacerbate the risk of refractive errors.[2] Similar findings were reported in Hangzhou, China, where school-based studies showed a rapid increase in myopia during COVID-19 restrictions, with only a modest decrease after reopening.[3] A longitudinal study also confirmed accelerated myopia progression among adolescents with high screen exposure.[4] Refractive errors occur when incoming light cannot be properly focused on the retina, causing blurred vision, and they are the second leading cause of low vision worldwide.[5] The International Agency for the Prevention of Blindness (2021) reported approximately 165 million children globally with refractive disorders, projected to rise to 275 million by 2050. In Indonesia, about 3.6 million children are estimated to suffer from refractive errors, with three out of four lacking corrective glasses.[6] The IAPB also emphasizes that school-based screening should be integrated with referral systems and follow-up, not only one-time screenings.[7]

Uncorrected vision problems can impair learning ability, academic performance, and long-term quality of life. Refractive errors also raise the risk of pathological changes leading to blindness. The impact extends to psychosocial well-being and educational opportunities. Unfortunately, many adolescents remain undetected due to low awareness and limited access to regular screenings. A meta-analysis found the prevalence of uncorrected refractive errors around 12.1% (95% CI) globally, underscoring the scale of the issue.[8] Early detection and management are crucial to prevent complications, aligning with government efforts to strengthen

promotive and preventive services.[6] Moreover, school-based interventions have been shown to be cost-effective, reducing the burden of uncorrected refractive errors and improving academic performance.[9]

Several studies in Indonesia highlight this growing burden. In Manado, a study reported a high prevalence of ametropia dominated by astigmatism and myopia among tenth-grade students.[10] Research in rural junior high schools in Badung District found a prevalence of 13.96%, showing environmental and geographic influence on eye health.[11] Screening in West Jakarta elementary schools also revealed many undiagnosed refractive errors, stressing the need for routine school-based examinations.[12] In Semarang, schoolchildren demonstrated limited knowledge, attitudes, and behaviors about eye health despite the increasing prevalence of vision problems.[13]

Similarly, research in Bandung confirmed that refractive errors as one of the most common disorders in junior high students, often uncorrected due to lack of early detection.[14] A community-based study at Islamic boarding schools also found refractive disorders frequently overlooked.[15] Early-life screening studies in Makassar further emphasize the value of detecting vision problems before school entry.[16] Complementary findings by Basrowi et al. (2024) stress that successful school screening depends not only on tools but also on trained educators, resources, and effective referral systems.[17]

In response, the STEM Eye Care Program strengthened collaborative thematic community service through International Service Learning with The Hong Kong Polytechnic University. As part of this initiative, a program was implemented at Stella Duce 2 Senior High School, Yogyakarta, combining promotive services (education, discussions, quizzes) and preventive services (basic eye health screening). The program aimed to raise awareness and reinforce the importance of eye health among adolescents.

To enhance engagement, a short video competition themed *"Jaga Mata untuk Masa Depan Cerah"* was also organized. This activity positioned students not only as information recipients but also as agents of change, sharing health messages via social media. Overall, these activities were expected to create sustainable impact through collaborative learning between university students, high school students, and the community.

METHODS

This community service program was conducted at Stella Duce 2 Senior High School, Yogyakarta, from August 4 to 8, 2025. The primary participants were all Grade X students, with teachers and staff as secondary targets. The program integrated promotive, preventive, and participatory approaches: (1) health education through presentations, discussions, and quizzes; (2) basic eye examinations including visual acuity, ocular motility, color vision, pupillary reflex, and external-internal eye checks; and (3) a short video competition themed *"Jaga Mata untuk Masa Depan Cerah."*

Success indicators included: student participation in education sessions (≥60%), eye examinations (≥50%), proper documentation and follow-up of findings, and production of short educational videos. Tools used were Snellen charts, Ishihara books, pen lights, magnifiers, ophthalmoscopes, and digital media for documentation. In summary, the program was designed to raise awareness of eye health, enable early detection of refractive errors, and encourage student involvement in creative health promotion.

RESULTS AND DISCUSSION

The program *"Jendela Belajar: Education, Competition, and Basic Eye Examination"* was successfully implemented at Stella Duce 2 Senior High School, Yogyakarta, from August 4 to 8, 2025.

Health Education

More than 60% of Grade X students participated in interactive sessions that included lectures, discussions, quizzes, and ice-breaking games. These activities fostered active engagement and emphasized refractive errors, the importance of early detection, and strategies for maintaining eye health in the digital era. Students responded positively, showing increased awareness and curiosity through active questioning.

Basic Eye Examinations

A total of 190 individuals (168 students and 22 staff) underwent screening, which included visual acuity (near and distance), ocular motility, color vision, pupillary reflex, and external-internal eye checks. Several students were found with reduced visual acuity requiring further correction, while some showed color vision abnormalities. Data were systematically recorded and provided to participants for follow-up. Of the 168 students, 110 were female and 58 were male. Based on data obtained from health examinations, the distribution of refractive disorders, namely myopia and/or astigmatism, was found in 50 children, and 3 of them had other ocular disorders and need further examination. The data is shown in Table 1. The participation rate (99.5% per class) exceeded the target, showing the feasibility of school-based screening.

Table 1. Prevalence of Refractive Disorders in Tenth Grade Students

Refractive Disorder	Case (n=50)	Percentage (%)
Myopia	35	70
Astigmatism	10	20
Myopia and Astigmatism	5	10

Video Competition

Two classes participated in the short video competition themed *"Jaga Mata untuk Masa Depan Cerah."* Although the number of participants was lower than expected, the outputs met the criteria of originality, educational value, and suitability for publication. The videos were shared on social media, receiving positive engagement and extending outreach beyond the school.

Publication and Documentation

All activities were documented through photos, videos, and social media posts via the official STEM Eye Care Program accounts. Analytics showed that reach and engagement surpassed expectations, confirming the potential of digital platforms in adolescent health promotion.

Impact of the Program

The program improved students' awareness of eye health, encouraged proactive behavior such as regular vision checks, and stimulated creativity in promoting health messages digitally. The integration of promotive and preventive strategies proved effective in addressing refractive errors as a common adolescent health problem.

Challenges and Solutions

Several challenges were encountered during the program. Limited time required the team to condense educational sessions; this was addressed by providing supplementary materials in video and leaflet form and could be further improved by integrating eye health education into regular school schedules or extracurricular activities. Uneven participation in the video competition was mainly due to technical limitations. To overcome this, the team provided simple training and examples, while further programs may also consider offering alternative formats such as poster or infographic competitions, or encouraging group-based projects so that students with limited technical skills can still contribute. Some students experienced anxiety during examinations, which was reduced through clear explanations and and peer support; additional strategies such as using peer facilitators or short orientation sessions before screening could further normalize the process. Technical issues with digital recording caused some data loss, which was resolved through backup manual forms and stricter data checks. For sustainability, adopting a dual recording system from the start and assigning a dedicated data manager could enhance data quality and security.

Discussion

The results of this program align with recent research on school-based vision interventions and digital eye health, emphasizing the value of integrating promotive and preventive strategies in adolescent populations. More than 60 % of Grade X students actively engaged in health education activities, and nearly full participation was achieved in basic eye screening. These findings are consistent with Anokye et al. (2025) who reported that school-based programs improve knowledge, attitudes, and compliance with spectacle use.[18] The detection of refractive errors and color vision abnormalities in some participants also highlights the importance of early identification, as noted by Little et al. (2025), who emphasized the need for adequate resources and referral systems in school vision screening.[19] A study in China shows that after the Covid pandemic, there has been an increase in the prevalence of myopia, and more so among women.[20]

The incorporation of digital and participatory education is also in line with the growing role of technology in eye health. Chen et al. (2025) suggested that digital health interventions can extend outreach and support self-monitoring, complementing traditional methods.[20] Similarly, Zong et al. (2024) found that higher screen time is associated with increased risk of myopia in children and adolescents.[21] This finding reinforce recent Indonesian systematic review that identified pandemic-related lifestyle changes, particularly increased screen time and reduced outdoor activity, as major contributors to pediatric myopia.[22] A meta-analysis further demonstrated that each additional hour of daily screen use increase the risk of myopia by 21%.[23] These studies support the program's health messages on managing screen time, taking regular breaks, and encouraging outdoor activities. Moreover, evidence from randomized controlled trials has shown that digital eye health applications improve adherence to screen time guidelines and reduce symptoms of digital eye strain. In addition to screentime, other studies have also shown that teaching and learning activities increase myopia, due to exam preparation requiring high levels of focus, competitive pressure, and frequent close-up activities.[23–25]

The challenges encountered in this program reflect common issues in school-based health initiatives. Time limitations required condensed sessions, but the provisions of supplementary materials and the potential integration of eye health education into school curricula could ensure sustainability. Uneven participation in the video competition was partly due to technical barriers; however, simple training, group-based projects, and

alternative competition formats may increase inclusivity. Student anxiety during examinations was reduced with peer support and clear explanations, and could be further addressed by introducing orientation sessions to normalize the process. Technical issues in data recording were resolved through backup manual forms and cross-checking, yet future programs should consider dual recording systems and dedicated data managers to safeguard data integrity.

Overall, the findings demonstrate that combining interactive education, routine screening, and digital health promotion is an effective approach to increase awareness, encourages proactive behaviors, and enabling early detection of refractive errors in adolescents. Future initiatives could expand by incorporating evidence-based digital tools, providing structured follow-up for detected cases, and designing strategies to maximize student participation in creative health promotion activities.

CONCLUSION

This community service program successfully improved adolescent awareness of eye health through a combination of education, basic eye examinations, and creative student engagement. More than 60% of students actively joined the educational sessions, while 190 individuals, including students, teachers, and staff, underwent basic eye screening, which identified several cases requiring correction or referral. Although the short video competition involved only two classes, it generated original and educational content that broadened outreach via social media and enhanced students' creativity and digital literacy.

Overall, the program demonstrated that school-based initiatives can effectively integrate promotive and preventive strategies while empowering students as agents of change in health promotion. These results emphasize the importance of incorporating regular vision screening and interactive health education into school settings, as well as leveraging digital platforms to expand the impact of community service activities.

SUPLEMENTARY DOCUMENTATION

Figure 1. Health education and fun quiz session

Figure 2. Basic eye examination activities

Figure 3. Video competition

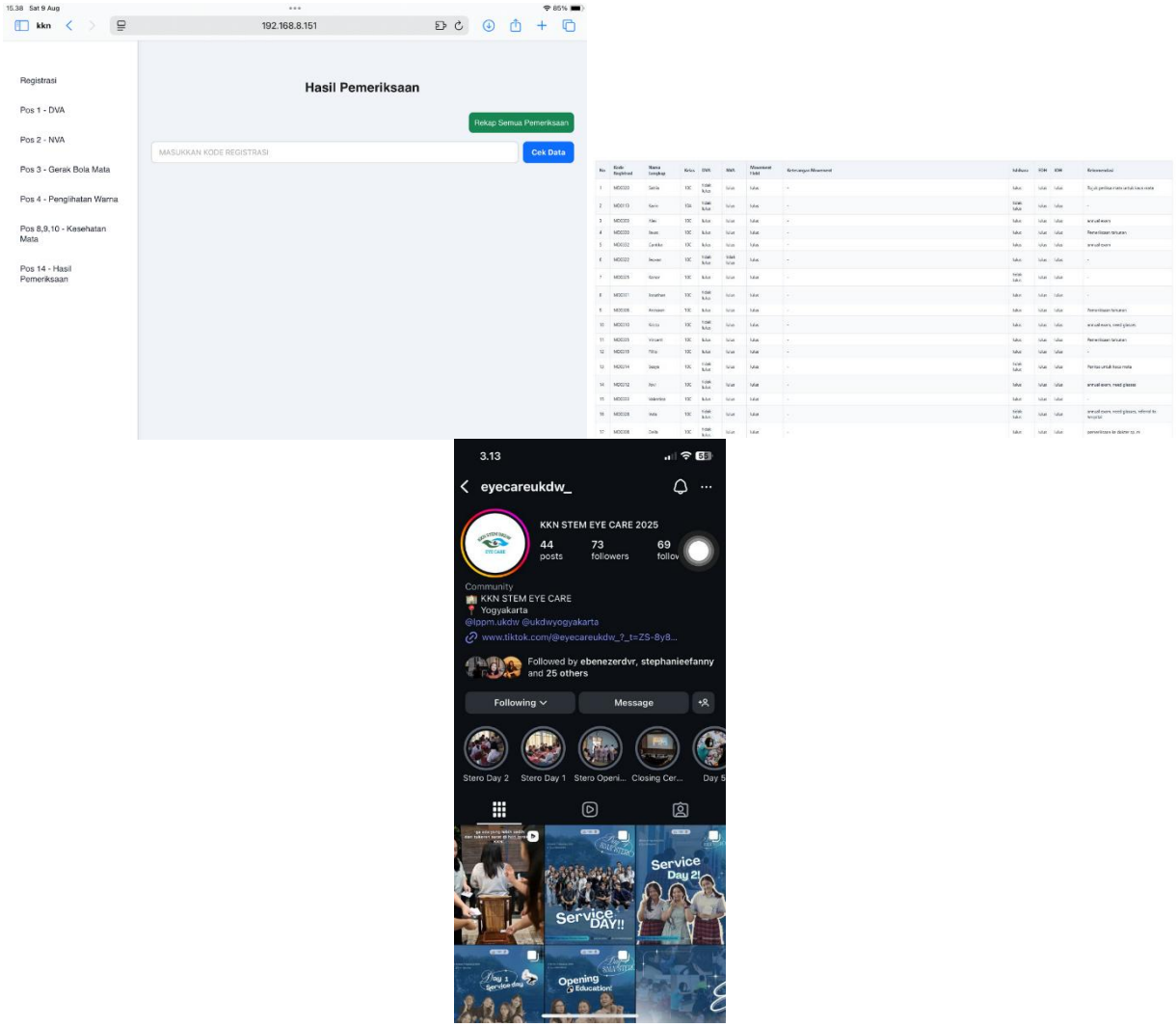

Figure 4. Data documentation and Publication

ACKNOWLEDGEMENTS

The authors would like to thank Stella Duce 2 Senior High School, Yogyakarta, for their support and cooperation throughout the program. Gratitude is also extended to the teachers, staff, and students for their active participation, as well as to the Research and Community Service Institute (*Lembaga Penelitian dan Pengabdian pada Masyarakat/LPPM*), Universitas Kristen Duta Wacana and the Faculty of Medicine, Universitas Kristen Duta Wacana, for their guidance and support. Finally, the authors sincerely acknowledge the collaboration with The Hong Kong Polytechnic University through International Service Learning, which provided valuable academic and cross-cultural insights that enriched this community service program

REFERENCES

1 Ichsan Moh. Edukasi Kesehatan Mata dan Deteksi Dini Gangguan Mata pada Santri di Pondok Pesantren. *Madago Community Empowerment for Health Journal* 2022; **1**: 32–39.

2 Darusman KR, Basrowi RW, Wilar Y, Hartono I, Moeloek NF. The Post-pandemic Prevalence of Refractive Errors among Elementary School Children in Jakarta. *Open Public Health J* 2023; **16**. doi:10.2174/0118749445277165231128042842.

3 He T, Yin L, Zheng Q, He B, Xu Z, Hu T *et al.* Survey on pattern of myopia in school children in Hangzhou after the COVID-19 pandemic: a school-based vision screening study. *BMC Public Health* 2024; **24**: 1850.

4 Wang J, Li Y, Musch DC, Wei N, Qi X, Ding G *et al.* Progression of Myopia in School-Aged Children After COVID-19 Home Confinement. *JAMA Ophthalmol* 2021; **139**: 293.

5 Muhammad Jabbar J, Ghani Mahenra R. Gambaran Pengetahuan Mahasiswa Tingkat Satu Diploma Tiga Refraksi Optisi Tentang Kelainan Refraksi. *Jurnal Sehat Masada* 2021; **15**: 56–64.

6 Kementerian Kesehatan Republik Indonesia. Sayangi Mata Anak Sedari Dini untuk Investasi Masa Depan. Kemenkes RI. 2024.https://kemkes.go.id/id/sayangi-mata-anak-sedari-dini-untuk-investasi-masa-depan (accessed 9 Aug2025).

7 Gilbert C, Minto H, Morjaria P, Khan I, Wilson D, Ho M *et al.* Standard Guidelines for Comprehensive School Eye Health Programmes Background. 2018.

8 Halim A, Suganda R, Sirait SN, Memed FK, Syumarti, Rini M *et al.* Prevalence and associated factors of uncorrected refractive errors among school children in suburban areas in Bandung, Indonesia. *Cogent Med* 2020; **7**. doi:10.1080/2331205X.2020.1737354.

9 Naidoo KS, Leasher J, Bourne RR, Flaxman SR, Jonas JB, Keeffe J *et al.* Global Vision Impairment and Blindness Due to Uncorrected Refractive Error, 1990–2010. *Optometry and Vision Science* 2016; **93**: 227–234.

10 Putri AJ, Umboh AMS, Najoan IHM. Prevalensi Kelainan Refraksi pada Anak Remaja Kelas X di SMA Rex Mundi Manado. *e-CliniC* 2024; **12**: 271–276.

11 Made N, Suryathi A, Utari L, Handayani AT, Andayani A, Wayan I *et al.* Prevalence of refractive error at rural junior high students In Badung District. *DiscoverSys | Bali Journal of Ophthalmology* 2019; **3**: 21–24.

12 Da Costa SA, Silaen DH, Farfar IO. Prevalence of Refractive Errors in Elementary School Children at SDN 16 and 17 Duri Kepa, West Jakarta, 2023/2024. *Jurnal MedScientiae* 2025; **4**. doi:10.36452/jmedscientiae.v4i2.3834.

13 Nugroho T, Rahmi FL, Guna Dharma A, Saubig AN. Screening of Refractive Disorders and Eye Health Awareness: Knowledge, Attitudes, and Behaviors of Elementary School Children in Semarang. *Diponegoro International Medical Journal* 2025; **6**: 1–6.

14 Nikmah ST, Rifada RM, Santoso PTR. Refractive Errors in State Junior High School Students in Bandung. *althea medical journal* 2016; **3**: 545–548.

15 Pamungkas M, Adi MS, Sutiningsih D, Kartasurya MI, Budijitno S. Refractive Errors in Students Islamic Boarding School Islamic Association 31 Banjaran Bandung. *Jurnal Epidemiologi Kesehatan Komunitas* 2025; **10**: 72–79.

16 Rimayanti U, Azis TA, Ningsih IY, Fadhila AN, Maharani RN. Visual acuity and factors influencing it in toddlers in Makassar area, Indonesia. *Delta Journal of Ophthalmology* 2025; **26**: 150–155.

17 Basrowi RW, Darusman KR, Wilar Y, Rahayu T, Lestari YD, Moeloek ND. Key Dimensions of Refractive Errors Screening at School in Indonesia: A Primary Educator's Perspective. *National Journal of Community Medicine* 2024; **15**: 314–319.

18 Anokye GO, Price-Sanchez C, Yong AC, Ali M, Tate C, Graham R *et al.* School-based eye health interventions for improving eye care and spectacles compliance in children in low- and middle-income countries: A scoping review. *AJO International* 2025; **2**: 100126.

19 Little J-A, Chan VF, Saw S-M, Tham YC, Chew L, Foo LL *et al.* Current status of school vision screening—rationale, models, impact and challenges: a review. *British Journal of Ophthalmology* 2025; : bjo-2024-326726.

20 Chen J, Lee D, Negishi K, Tsubota K, Kurihara T. Digital health as a scalable strategy for equitable myopia management in East Asia. *Asia-Pacific Journal of Ophthalmology* 2025; : 100241.

21 Zong Z, Zhang Y, Qiao J, Tian Y, Xu S. The association between screen time exposure and myopia in children and adolescents: a meta-analysis. *BMC Public Health* 2024; **24**: 1625.

22 Tan S, Yulia DE. Pediatric Myopia and Its Risk Factors During the COVID-19 Pandemic: A Systematic Review. *Jurnal Biomedika dan Kesehatan* 2024; **7**: 362–373.

23 Ha A, Lee YJ, Lee M, Shim SR, Kim YK. Digital Screen Time and Myopia: A Systematic Review and Dose-Response Meta-Analysis. *JAMA Netw Open* 2025; **8**: e2460026.

24 Knowles MS, Holton III EF, Swanson RA. *The Adult Learner*. Routledge, 2014.

25 Rachmat B, Mustakim M, Anwas R, Trianto AB, Pratiwi AP, Perkasa TAB *et al. Kesehatan Lingkungan dan Kesehatan Kerja: Paparan, Risiko dan Strategi Mitigasi*. Repositori Kakinaan: Solok, 2025.