ORIGINAL ARTICLE

ESTABLISHING A MULTI-SECTORAL FRAMEWORK FOR CHILDREN VISION: THE STANDARD OPERATING PROCEDURE (SOP) OF THE VISION FOR EDUCATION (V4E) PROGRAM IN MALAYSIA

Nor Diyana Hani Ghani[1], Mariah Asem[1], Azlina Mokhtar[2*], Maimunah Abdul Muna'aim[2], Fajarul Hani Ahamd Termizi[1], NurHafizah Muhd Khairi[1], Siti Husna Hussein[2], Hafiz Jaafar[3] and Amirah Azzeri[3]

[1]Our Optometrist Vision Care, Kuala Lumpur, Malaysia
[2]Ophthalmologist Unit, Faculty of Medicine and Health Science, Universiti Sains Islam Malaysia, Nilai, Malaysia
[3]Public Health Unit, Faculty of Medicine and Health Science, Universiti Sains Islam Malaysia, Nilai, Malaysia

Corresponding author: Azlina Mokhtar
Email: drazlina06@usim.edu.my

ABSTRACT

Uncorrected refractive error (URE) remains a leading cause of preventable visual impairment globally. Early intervention is critical during childhood to support visual and educational development. In alignment with the World Health Organisation's (WHO) initiative to scale up refractive error management, the Vision for Education (V4E) program was established in Malaysia to facilitate access to refractive care among economically vulnerable children, supporting the broader principles of Universal Health Coverage (UHC) and the health-related Sustainable Development Goals (SDGs). This descriptive programme implementation report documents the development, validation, pilot testing, and implementation of a Standard Operating Procedure (SOP) for the V4E programme. A multi-phase approach comprising stakeholder consultation, expert validation, pilot testing, and national programme was undertaken. The six-month pilot phase was conducted from April to September 2021 across 10 selected hospitals, followed by national programme from October 2021 to January 2023. The V4E programme utilised a multi-sectoral collaborative framework involving non-profit organisations (NGOs) and public, university, and private health sectors. A formal SOP was developed through stakeholder consultations, expert input, and pilot testing to assess the operational feasibility of the programme's administrative and clinical workflows. During national programme, the SOP facilitated the integration of 56 multidisciplinary teams comprising public and university hospitals and private optometric practices across Malaysia. A total of 982 eligible children underwent comprehensive eye examinations and received free refractive corrections through the programme. The findings describe the implementation and operational feasibility of a standardised, multi-sectoral workflow for delivering refractive care to economically vulnerable children. These findings should not be interpreted as evidence of programme effectiveness, sustainability, scalability, or population-level impact. Further independent and longitudinal evaluation is required to assess these outcomes.

Keywords*: *children, vision, refractive error, B40, eye care, standard operating procedure

INTRODUCTION

Globally, uncorrected refractive error (URE) is a primary aetiology of visual impairment, defined by the World Health Organisation (WHO) as presenting distance visual acuity worse than 6/12 in the better eye, affecting both children and adult population across all socioeconomic strata[1,2]. It currently stands as the second leading causes of blindness worldwide [3,4]. According to the World Health Organization (WHO), approximately 19 million children aged 5 to 15 are affected by visual impairment; notably, 67% of these cases—representing 12.8 million individuals—are attributed to URE[5].

URE is increasingly recognized not merely as an isolated clinical deficit, but as a critical public health challenge deeply intertwined with systemic socioeconomic inequality. According to the World Health Organization's *World Report on Vision*, access to basic refractive services remains unevenly distributed across global populations, with vulnerable groups—particularly children in low- and middle-income strata—bearing a disproportionate burden of unaddressed visual impairment. Vision serves as the predominant sensory modality for early childhood learning, estimated to account for up to 80% of classroom information processing. Consequently, persistent visual deficits during key formative years compound educational disadvantages, contributing to lower academic achievement, decreased lifetime earning potential, and the intergenerational transmission of poverty. Addressing pediatric URE therefore aligns directly with global health agendas, including Sustainable Development Goal (SDG) 3 (Good Health and Well-being) and SDG 4 (Quality Education).

Children populations are particularly vulnerable, as untreated URE can severely disrupt cognitive development, diminish

educational attainment, and impair psychosocial communication. Such neglect often results in decreased long-term productivity and social isolation, significantly compromising the overall quality of life[6-9]. In Malaysia, the prevalence of vision impairment among preschool-aged children is recorded at 12.5%, with 61% experiencing bilateral impairment and 59.1% suffering from moderate visual impairment[10]. While the absolute prevalence may appear lower than that of the adult population, the cumulative life-course impact on affected children is profound.

Evidence suggests a significant global disparity in eye care access; of the 2.3 billion individuals suffering from refractive errors, approximately 500 million lack access to affordable corrective services [11]. In the Malaysian context, the government has implemented extensive measures to identify URE, including mandatory screenings by preschool teachers[12] and the Amblyopia and Visual Impairment Screening (AVIS) initiative[13]. However, while existing program like AVIS excel at preschool-level identification and referral, a critical research and operational gap persist in the seamless transition from screening to actual treatment delivery. Standard screening pathways typically identify affected children but rely on families to independently seek out and finance corrective spectacles. Consequently, economic constraints and systemic poverty remain the primary barriers to treatment, even when clinical services are geographically available[14-16].

A fundamental challenge in existing public health frameworks is the structural disconnection between community screening initiatives and final clinical care delivery. While mass vision screening campaigns serve as a vital entry point for identifying visual deficits, traditional referral pathways routinely suffer from severe high-loss follow-up rates. In many resource-constrained healthcare systems, the pathway from screening to spectacle dispensing is fragmented; screening programmes identify the need but leave the financial and logistical burden of procuring corrective wear entirely on the family. This gap is particularly pronounced in economically vulnerable populations, such as Malaysia's B40 household tier, where competing household survival priorities frequently lead parents to delay or forego non-emergency medical interventions like vision correction. Achieving true Universal Health Coverage (UHC) thus demands integrated service delivery models that provide financial risk protection, ensuring that effective screening is seamlessly tied to subsidised, high-quality treatment without imposing catastrophic out-of-pocket costs on vulnerable families.

To address this gap and support UHC defines as the principle that all individuals receive the quality health services, they need without suffering financial hardship[17], the Vision for Education (V4E) initiative was established as a multi-sectoral community program. Launched by Our Optometrist Vision Care in collaboration with PruBSN Prihatin, the programme bridges the gap between detection and compliance by providing both comprehensive eye examinations and fully subsidised corrective lenses directly to underprivileged children aged 17 and below. This initiative aligns with the global mandate for UHC and the health-related Sustainable Development Goals (SDGs). V4E specifically targets Malaysia's B40 group, the bottom 40% of household income earners, which comprises approximately 3.16 million households with a monthly income below RM 4,849 (approximately USD 1,140)[18].

Unlike existing screening-only frameworks, there is a lack standardised frameworks that integrated private sector optometric resources with public health system to deliver end to end refractive care. This report documents the development, validation, pilot testing, and implementation of a Standard Operating Procedure (SOP) for V4E programme. The report describes the programme workflow, implementation process, operational experience across participating healthcare settings in Malaysia.

To overcome these delivery barriers, public health policy has increasingly prioritized multi-sectoral governance—linking public health services, private healthcare capacity, and civil society or philanthropic capital. In the context of eye care, reliance solely on overburdened public tertiary eye care centres often creates severe operational bottlenecks, leading to extended waiting times and geographic accessibility barriers for rural or suburban populations. Conversely, leveraging existing private optometric networks alongside university medical centres and public social welfare mechanisms enables cross-sectoral resource optimization. Standardized operational framework protocols are essential to coordinate these diverse stakeholders, ensuring clinical quality control, eligibility verification, administrative transparent tracking, and timely spectacle fabrication. Establishing structured workflows across public, university, and private sectors allows health systems to expand clinical capacity and deliver end-to-end pediatric vision care efficiently without overextending public budgetary limits.

METHODS

This article reports the development, validation, pilot testing, and subsequent implementation of the Standard Operating Procedure (SOP) for the Vision for Education (V4E) programme in Malaysia. A multi-phase programme development and implementation approach was adopted, comprising stakeholder consultation and eligibility framework development, expert validation and clinical SOP development, pilot feasibility testing, and national programme implementation. The process integrating clinical guidance with administrative procedures for multi-sectoral collaboration. The SOP development and implementation were structured into four stages: stakeholder consultation and eligibility framework, development, expert validation and clinical SOP development, pilot feasibility testing, and *national programme*. The resulting SOP provided a structured workflow for coordinating beneficiary eligibility assessment, clinical examination, financial approval, spectacle procurement, dispensing, and follow-up across participating healthcare providers.

Stage 1: Stakeholder Consultation and Eligibility Framework

The foundational stage involved strategic consultations between the programme coordinator (Our Optometrist Vision Care) and the principal philanthropic sponsor (PruBSN Prihatin) to align organisational objectives, define the programme scope, and establish a shared approach to children's eye health. A primary outcome was the formulation of a target beneficiary framework based on four core criteria:

1. Age: Children aged ≤17 years were eligible for inclusions to facilitate intervention during childhood and the school-age period.
2. Socioeconomic Status: Inclusion was restricted to children from households within the B40 income classification, representing the bottom 40% of Malaysian household income. The national household income threshold was based on Department of Statistics Malaysia (DOSM) data[18], with a gross monthly household income threshold of ≤RM4,849 (approximately USD1,140). Where applicable, state-level income indices were considered to account for regional differences.
3. Household Dependency: Priority was given to families with a higher dependency ration (e.g., ≥ 3 school-aged dependents per household) reflecting greater household financial dependency.
4. Ocular Condition: Children presenting with uncorrected refractive error (URE) requiring spectacle correction as their primary visual complaint.

Stage 2: Formalisation, Expert Validation, and Clinical SOP Development

The strategic and clinical workflows were formalised and validated through a multidisciplinary panel comprising two representatives from the programme coordinator, a Consultant Ophthalmologist, three Optometrists, and a representative from the Medical Social Work Department (MSWD) of the Ministry of Health (MOH).

The involvement of the MOH MSWD supported the development and review of the socioeconomic eligibility verification process using available official documentation and established administrative procedures. This stage established the core operational and clinical workflows of the SOP.

Standardised Clinical Examination Protocol:
To promote consistency across all participating centres, all enrolled children underwent a standardised examination conducted by registered optometrists. The examination included:

1. Visual Acuity Assessment: Distance visual acuity was measured using Snellen chart
2. Ocular Health and Alignment Screening: Assessment include cover/uncover test, torch-light assessment, and slit lamp examination.
3. Refraction and Prescribing: Objective and subjective refraction were performed to determine the final spectacle prescription.

Exclusion criteria and In-House Ocular Pathology Management:
Children were excluded from receiving free spectacles under the V4E programme if they already possessed functional eyeglasses with up-to-date prescription (refractive range <0.50D) or presented with primary non-refractive ocular conditions requiring medical, surgical, or orthoptic management, such as active anterior infections, congenital cataracts, glaucoma, retinal dystrophies, or strabismus.

As comprehensive eye examinations were conducted within participating hospital eye departments, a separate external referral pathway was not required for children examined in these setting. Children identified with underlying ocular conditions requiring further management were immediately referred to the relevant in-house Department of Ophthalmology for appropriate medical, surgical, or subspeciality care under the existing healthcare system.

Stage 3: Pilot Program and Feasibility Testing

Prior to national implementation, a six-month pilot phase was conducted from April to September 2021 across 10 selected public hospitals, with participating hospitals representing different states in Malaysia. The pilot phase was used to assess the operational feasibility and applicability of the SOP before wider implementation.

Three implementation areas were considered:

1. Operational Efficiency: Identifying infrastructure and workflow bottlenecks and refinement of communication channels among MSWD officers, hospital personnel, and optometrists.
2. Stakeholder Feedback: Collection of feedback from participating clinicians, administrative personnel, and families to identify areas requiring clarification or refinement within the workflow.
3. Process Optimisation: Refinement of eligibility verification procedures and coordination of lens fabrication, procurement, and spectacle dispensing processes.

Stage 4: National Implementation

Following completion of the pilot phase and subsequent SOP refinement, the programme proceeded to national implementation. The rollout included public hospitals, university hospitals, and selected private optometry practices to facilitate geographical coverage across Malaysia.

Implementation followed a phased approach:

1. Incremental Integration: Additional healthcare centres were progressively integrated into the V4E programme at approximately six-month intervals.
2. Resource Management: The phase approach supported the coordination of programme funding, optometrist clinical time, and optical frame and lens inventories.
3. Iterative Improvement: Operational observations and feedback from participating centres were incorporated into subsequent implementation phases to refine the workflow and address emerging operational requirements.

Ethic Consideration

Ethical approval for the V4E programme was obtained from the Human Research Ethics Committee, Universiti Sains Islam Malaysia (USIM) (Reference No. USIM/JKEP/2023-269). Written informed consent was obtained from the parent or legal guardian of each eligible child prior to participation in the programme. Where applicable, assent was also obtained from children who were able to provide assent. Programme records and participant information were handled confidentially and accessed only by authorised personnel involved in programme implementation and reporting. Identifiable participant information was not included in the analysis or reporting of the programme findings.

RESULTS

Stage 1: Stakeholder Consultation and Eligibility Definition

Eligibility criteria were established for Malaysian children aged 0–17 years, with the programme targeting children from households within the B40 socioeconomic category. Based on 2019 data from the Department of Statistics Malaysia (DOSM), the national B40 income threshold was set at a gross monthly household inform ≤RM 4,850 (approximately USD 1,140)[18]. To guide beneficiary selection according to household financial circumstances and number of dependents, a socioeconomic eligibility matrix combining household income and number of dependents was developed (Table 1).

Stage 2: Formalisation, Expert Validation, and Clinical SOP Development

The SOP was reviewed and refined through a structured consultation process involving a multidisciplinary expert panel. The panel comprised seven stakeholders: two representatives of the programme coordinator, one Consultant Ophthalmologist, three Optometrists, and one representative from the Medical Social Work Department (MSWD) of the Ministry of Health (MOH).

Following consultation, the administrative and clinical workflows were formalised. The resulting workflow is illustrated in the programme implementation flowchart (Figure 1). Participating centres received standardised briefings on eligibility verification, frame selection, dispensing procedures, and follow-up arrangements.

The implementation workflow comprised four main steps:

1. Clinical Assessment: Optometrists performed comprehensive ocular examinations for children who met the preliminary age and socioeconomic eligibility criteria.
2. Eligibility Verification: Socioeconomic information, including household income and number of dependents, was verified by the Medical Social Work Department (MSWD) in participating public hospitals or by authorized administrators in university and private practices setting.

3. Approval and Procurement: Verified applications were submitted to the programme sponsor (PruBSN Prihatin) for final budgetary approval. Following approval, Our Optometrist Vision Care coordinated the procurement of prescribed lenses and frames.
4. Quality Control and Dispensing: Spectacle underwent quality assurance inspection before being dispatched to the respective centres for dispensing. Follow-up arrangements were made where required.

Stage 3: Pilot Program and Feasibility Testing

The six-month pilot phase, conducted from April to September 2021 across 10 selected hospitals, was used to assess the operational feasibility of the SOP before national implementation. Predefined implementation indicators included administrative verification, spectacle dispensing turnaround time, and management of clinical referrals.

During Pilot Phase:

1. Verification Process: All screened applicant completed the socioeconomic verification process through the participating MSWD or designated administrative personnel without document rejection.
2. Turnaround Time: The mean time from clinical refraction to spectacle dispensing was 12.1 ± 2.3 days, within the predefined target of <14 days.
3. Protocol Adherence: All participating optometrists followed the specified prescribing protocol without documented protocol deviations.

Feedback from participating hospital teams indicated that the workflow was operationally clear, and no major structural modifications were required before national implementation.

Table 1: Mutually Exclusive Socioeconomic Eligibility Matrix by Household Income and Dependent

The number of dependents	Total household income
0 to 1	≤ RM 2500 (550 USD)
2 to 3	≤ RM 2500 – RM 3169 (550 – 699 USD)
4 to 5	≤ RM 3170 – RM 3969 (670 – 874 USD)
≥6	≤ RM 3970 – RM 4849 (875 – 1065 USD)

Conversion based on nominal programme exchange rate

Stage 4: National Implementation

Following completion of the pilot phase and subsequent SOP refinement, the V4E programme proceeded to national implementation from October 2021 to January 2023. During this period, the programme integrated 56 multidisciplinary teams across public hospitals, university medical centres, and selected private optometric practices

A total of 982 eligible children underwent comprehensive eye examinations and received refractive correction through the programme during the national implementation period. The programme also mobilised USD678,000 in funding during this period. Financial sustainability was not assessed as part of this programme implementation report.

Beneficiary Demographic and Regional Distribution

The mean age of beneficiaries was 9.36 ± 3.56 years (range, 0–17 years). Females accounted for 52.3% (n=514) and males for 47.7% (n=468). Beneficiaries were recorded across all 13 states and three federal territories in Malaysia (Table 2). The largest numbers were from Johor (18.8%, n=185), Sabah (17.4%, n=171), and Kelantan (15.9%, n=156).

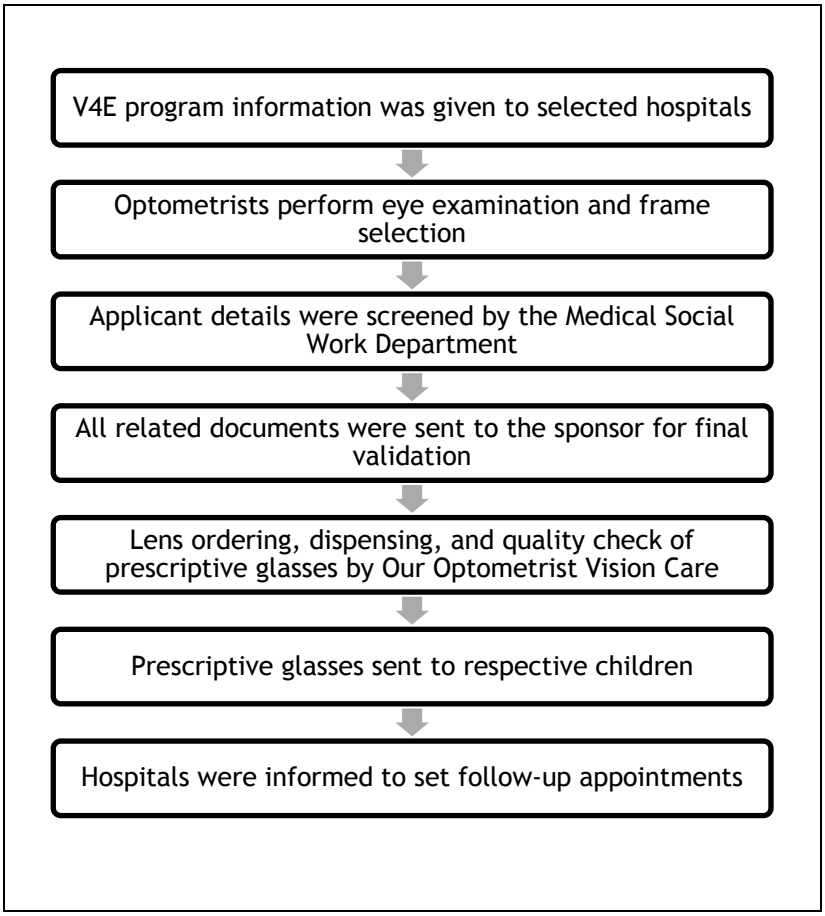

Figure 1: Flow chart of structure and mechanism for V4E program

Table 2: Demographic and Geographical Distribution of Program Beneficiaries (*N*=982)

Category/State	Frequency (n)	Percentage (%)
Female	514	52.3
Male	468	47.7
Johor	185	18.8
Sabah	171	17.4
Kelantan	156	15.9
Sarawak	84	8.6
Selangor	69	7.0
Negeri Sembilan	57	5.8
Kuala Lumpur	52	5.3
Perlis	49	5.0
Pahang	45	4.6
Melaka	38	3.9
Kedah	27	2.7
Perak	19	1.9
Wilayah Persekutuan Labuan	12	1.2
Penang	8	0.8
Terengganu	8	0.8
Putrajaya	2	0.2

DISCUSSION

The Vision for Education (V4E) programme established and implemented a standardised, multi-sectoral workflow for delivering refractive care to economically vulnerable children in Malaysia. The programme brought together public hospitals, university medical centres, private optometric practices, and non-profit organisations to coordinate eligibility assessment, clinical examination, refractive correction, spectacle procurement, and dispensing. The structured eligibility criteria, including household income and number of dependents, provided a defined approach for identifying children who met the programme requirements.

A key feature of the programme was the integration of socioeconomic verification with clinical assessment. The involvement of the Medical Social Work Department (MSWD) supported the verification of socioeconomic eligibility within participating public hospitals, while designated administrators performed this function in university and private settings. This workflow provided a structured mechanism for identifying beneficiaries according to the programme's predefined criteria. However, the present report did not formally assess the accuracy, reliability, or equity implications of the eligibility verification process.

The six-month pilot phase provided an opportunity to refine the administrative and clinical workflow before national implementation. The implementation indicators monitored during the pilot included socioeconomic verification, spectacle dispensing turnaround time, and adherence to the clinical protocol. Following completion of the pilot phase, the refined SOP was implemented across 56 multidisciplinary teams involving public, university, and private healthcare settings. These findings describe the operational implementation of the programme across participating centres but do not establish its effectiveness or broader population-level impact.

Comparison with Children Refractive Care Programmes

The V4E programme should be interpreted within the context of other children's refractive care and school-based vision programmes. Large-scale programmes in other countries have adopted population-based or school-based screening approaches and have reached substantially larger numbers of children through systematic screening and spectacle provision[19,20]. In contrast, V4E was designed as a targeted, clinic-based programme focusing on economically vulnerable children who fulfilled predefined eligibility criteria.

The differences in programme objectives and delivery models are important when interpreting the number of beneficiaries reached. Population-based programmes primarily aim to maximise screening coverage, whereas V4E focused on facilitating access to refractive care among a defined socioeconomic group. Therefore, the number of beneficiaries should not be used alone to compare programme performance across different models of care.

During the national implementation period, 982 eligible children underwent comprehensive eye examinations and received refractive correction through 56 multidisciplinary teams. This finding documents the delivery of the programme and the use of the SOP across participating healthcare settings. However, the absence of a population-based denominator, comparison group, and longitudinal outcome measures means that the present findings cannot determine programme effectiveness, coverage, equity, sustainability, or population-level impact.

Potential Benefits of Refractive Correction

Appropriate refractive correction may provide important visual and functional benefits for children. Previous studies have reported associations between spectacle correction and outcomes such as educational performance, school participation, visual functioning, and quality of life[21–23]. However, these outcomes were not measured systematically among V4E beneficiaries.

Consequently, the present report does not allow changes in educational performance, quality of life, psychosocial well-being, or other longer-term outcomes to be attributed to the V4E programme[21–23]. These potential benefits provide a rationale for future evaluation rather than outcomes demonstrated by the current programme.

Expanding Health Promotion Frameworks and Health Literacy

Beyond expanding clinical coverage, the multi-sectoral approach of the V4E programme aligns directly with key public health frameworks, specifically the Ottawa Charter for Health Promotion. Health promotion necessitates moving beyond passive disease identification toward "creating supportive environments" and "reorienting health services." While existing national initiatives effectively identify visual impairment at the preschool level, screening in isolation often fails to yield high treatment compliance if structural barriers persist. V4E operationalizes health promotion principles by reorienting clinical optometric care into a collaborative public-private-philanthropic framework. By fully subsidizing spectacle procurement and integrating care within accessible healthcare settings, the programme creates a supportive environment that absorbs the financial shocks usually borne by economically vulnerable households. However, health promotion also requires addressing health

literacy. Low parental awareness, fear that spectacle wear worsens intrinsic visual acuity, and social stigma surrounding children wearing eyeglasses frequently result in poor compliance, even when clinical services are geographically accessible[14,16]. Future iterations of multi-sectoral vision frameworks should incorporate targeted community health education and parental literacy interventions to bridge the gap between initial screening, spectacle uptake, and long-term compliance.

Refractive Error Management within Primary and Secondary Prevention

From a disease prevention perspective, early pediatric refractive management operates as a critical secondary and tertiary prevention strategy. Applying Leavell and Clark's levels of prevention, visual screening and immediate spectacle provision function as secondary prevention by arresting the progression of visual degradation and preventing irreversible amblyopia. Because human visual cortex development exhibits peak neuroplasticity in early childhood, delays in providing optical correction during critical developmental windows can cause permanent loss of binocularity and spatial vision[10]. Furthermore, timely refractive correction serves as tertiary prevention against downstream cognitive, academic, and psychosocial morbidities. Uncorrected refractive error in school-aged children is strongly associated with diminished educational performance, impaired motor coordination, and reduced quality of life[21,24]. By mitigating financial access barriers for B40 households, the V4E programme prevents the long-term accumulation of developmental deficits, elevating a simple optical correction into an upstream public health strategy.

Limitations

Several limitations should be considered when interpreting the findings. First, the V4E programme was intentionally targeted at children from economically vulnerable households who fulfilled predefined eligibility criteria. Therefore, the findings describe the implementation of a targeted service model and may not be generalisable to the wider children's population.

Second, a population-based denominator was not available. Consequently, the proportion of potentially eligible children reached and the extent of unmet need for refractive care could not be determined.

Third, although the SOP underwent stakeholder consultation, expert review, and pilot testing, the validation process primarily focused on operational feasibility and stakeholder input. Formal assessment of implementation fidelity, acceptability, reliability, effectiveness, and cost-effectiveness was not undertaken.

Finally, information on spectacle adherence, beneficiary satisfaction, longer-term clinical outcomes, educational outcomes, and quality of life was not systematically collected. These measures would be important for determining whether the provision of refractive correction resulted in sustained use and meaningful longer-term benefits.

Future Implications

Future evaluation of the V4E programme should incorporate longitudinal follow-up and clearly defined implementation outcomes. Measures of spectacle adherence, beneficiary and parent satisfaction, visual outcomes, educational performance, and quality of life could provide a more comprehensive assessment of the benefits associated with refractive correction. Population-based denominators would also allow programme reach and unmet need to be better characterised.

Independent evaluation could further assess the programme's longer-term outcomes, resource requirements, cost-effectiveness, and applicability across different healthcare settings. Such evaluation would provide evidence to determine whether the workflow can be appropriately adapted or extended to other populations or settings.

CONCLUSIONS

The Vision for Education (V4E) programme developed and implemented a standardised, multi-sectoral workflow for delivering refractive care to economically vulnerable children in Malaysia. During the implementation period, the programme facilitated comprehensive eye examinations and refractive correction for 982 eligible children through 56 multidisciplinary teams across public, university, and private healthcare settings. These findings describe the implementation and operational feasibility of the programme but do not establish its effectiveness, sustainability, scalability, equity, or population-level impact. Further independent and longitudinal evaluation is required to assess these outcomes.

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Conflicts of Interest
The author declares no conflict of interest.

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