



RESEARCH ARTICLE

URL article: <http://jurnal.fkmumi.ac.id/index.php/woh/article/view/woh9317>**The Contribution of Optometrists to Preventive Eye Health Care in Indonesia****Murni Marlina Simarmata¹, Febri Maryani², Stepanus Silaban³**^{1,2,3} Academy of Refractive Optics and Optometry Gapopin Jakarta, IndonesiaEmail Corresponding Author(^c): murnims2026@gmail.com
murnims2026@gmail.com¹, febrimaryani123@gmail.com², digitalsiip08@gmail.com³**ABSTRACT**

Optometrists have an important role in preventive eye health through refractive error screening, early detection, and community education. However, evidence regarding their contribution to preventive eye health care in Indonesia remains limited. This study aimed to examine the association between optometrists' contributions and preventive eye health care in Indonesia. A cross-sectional quantitative study was conducted among 97 optometrists in Indonesia. Data were collected using a structured questionnaire and analyzed using descriptive statistics, Pearson correlation, and simple linear regression with SPSS version 20. Statistical significance was set at $p < 0.05$. Most respondents were aged 31–45 years (55.7%), had a Diploma III qualification (74.2%), had 0–5 years of practice experience (47.4%), and worked in optical practices (72.2%). The highest positive responses concerned refractive error screening (87.5%) and community eye health education (86.5%). A strong positive association was found between optometrists' contribution and preventive eye health care ($r = 0.919$, $p < 0.001$). Regression analysis showed a significant positive association ($B = 0.963$, $\beta = 0.919$, $p < 0.001$), with the model accounting for 84.5% of the variance in the measured preventive eye health care score. Optometrists' contribution was strongly associated with preventive eye health care. Strengthening competencies, interprofessional collaboration, referral systems, and integration into primary and community eye-care services is recommended.

Keywords: Optometrists; preventive eye health care; eye health services; vision screening; eye health education; Indonesia

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INTRODUCTION

Vision and eye health are essential components of overall health, well-being, and participation in daily life. Visual impairment remains an important global public health concern, particularly when visual problems are not detected and managed at an early stage. Uncorrected refractive errors and other eye conditions may affect learning, work productivity, independence, and quality of life. Preventive eye care, including health education, vision screening, early detection, and timely referral, is therefore an important component of comprehensive eye health services ^{1,2,3}.

In Indonesia, visual impairment and blindness remain significant public health concerns. A substantial proportion of vision problems can be prevented, treated, or appropriately managed when detected early. Promotive and preventive interventions, such as eye health education, screening for refractive errors, and early identification of ocular abnormalities, are important strategies for improving access to eye care. However, limited public awareness, delayed access to appropriate services, and gaps in the availability of eye care personnel may contribute to the persistence of avoidable visual problems ⁴. These challenges highlight the need for accessible and effective primary eye care services that can provide early identification, appropriate management, and referral when necessary.

Optometrists are primary eye care professionals whose scope of practice includes assessment of visual function, detection and management of refractive errors, provision of optical correction, patient education, and referral of individuals who require further medical assessment ^{4,5}. Depending on national regulations and professional competencies, optometrists may also contribute to the identification of ocular and systemic conditions and the provision of low-vision and other vision-related services ⁶. The World Council of Optometry (WCO) ⁷ emphasizes that optometric practice extends beyond refraction and includes comprehensive eye and vision care, health promotion, disease prevention, and appropriate referral within an integrated eye care system ⁶. Thus, optometrists have the potential to contribute substantially to preventive and primary eye care, particularly through early detection, health education, and community-based services ^{8, 9}.

Evidence from different settings indicates that strengthening primary eye care and integrating optometrists into health systems can improve access to eye care and support appropriate referral pathways ^{6,10}. Early detection and correction of refractive errors are also associated with improved visual functioning and quality of life ¹¹. However, the scope and implementation of optometric practice vary considerably across countries because of differences in education, regulation, professional competencies, health-system structures, and available resources ¹². Consequently, evidence from other countries cannot necessarily be directly applied to the Indonesian context.

Although optometrists are increasingly recognized as important providers of primary eye care, empirical evidence regarding the factors that enable or constrain their preventive role within the Indonesian health system remains limited. In particular, limited evidence is available regarding how professional competence, healthcare system support, and perceived barriers are associated with the

implementation of preventive optometric services. Professional competence is important because effective preventive care requires appropriate knowledge, clinical skills, communication abilities, and decision-making capacity. At the same time, the ability of optometrists to implement preventive services may depend on healthcare system support, including workplace facilities, equipment, professional collaboration, referral mechanisms, and organizational support. Perceived barriers, including limitations in resources, public awareness, professional recognition, and access to services, may further influence the implementation of preventive activities ¹³.

The role of optometrists is increasingly relevant within the changing landscape of global eye health. The World Health Organization (WHO) estimates that at least 2.2 billion people globally have vision impairment, with at least 1 billion cases considered preventable or yet to be addressed. Major challenges include inadequate access to eye care, shortages of trained eye-care personnel, and insufficient integration of eye-care services within health systems ¹⁴. These challenges highlight the need for a coordinated eye-care workforce capable of providing services across the continuum of care, including health promotion, prevention, early detection, treatment, referral, and rehabilitation.

Uncorrected refractive error is particularly relevant to preventive eye health because it remains one of the leading causes of vision impairment worldwide. The WHO has identified effective refractive error coverage as a global priority and established a target of increasing effective refractive error coverage by 40 percentage points by 2030. Achieving this target requires accessible, affordable, quality-assured, and people-centred refractive services supported by an appropriately trained workforce ^{15, 14}. In this context, optometrists may contribute substantially to primary eye care through vision assessment, refractive error screening and correction, identification of ocular abnormalities, patient education, and referral when further examination or specialist management is required.

The contribution of optometrists, however, should not be viewed only in terms of individual clinical competencies. Contemporary eye-care models emphasize integrated people-centred eye care (IPEC), in which services are coordinated across communities, primary care, specialist services, and other relevant sectors. WHO recommends strengthening the eye-care workforce, reorienting services toward primary and community care, establishing functional referral linkages, coordinating services across sectors, and engaging communities as important strategies for improving eye health outcomes ¹⁵. Evidence from low- and middle-income countries indicates that integration of eye care into existing health systems can be constrained by inadequate referral and information systems, limited resources, competing priorities, and insufficient coordination among providers ¹⁶. Therefore, the effectiveness of optometric preventive services may depend not only on individual professional competence but also on the healthcare environment in which optometrists practice.

Professional competency is another important component of preventive eye care. The WHO Eye Care Competency Framework provides a comprehensive framework for developing an effective eye-care workforce and emphasizes competencies across clinical practice, professionalism, community and

advocacy, leadership, evidence, and continuing learning¹⁷. The framework recognizes that workforce development should be aligned with population needs and adapted to local contexts. For optometrists, this implies that preventive practice requires not only technical skills in vision and refractive assessment but also competencies in communication, health education, early identification, referral, teamwork, and engagement with communities.

Interprofessional collaboration is also essential because preventive eye care frequently requires continuity between primary and specialist services. Functional referral pathways enable patients identified with conditions beyond the scope of routine optometric management to receive appropriate ophthalmological assessment and treatment. Studies of integrated eye-care models have shown that service coordination and relationship-building among providers can facilitate integration, whereas weak referral mechanisms may limit continuity of care¹⁸. Similarly, community engagement has been identified as an important component of people-centred eye care, particularly for health promotion, screening, detection, referral, and navigation of eye-care services¹⁶. These perspectives indicate that the contribution of optometrists should be understood within a broader system of professional collaboration and community-based eye health.

In Indonesia, these issues are particularly relevant because the delivery of eye health services involves multiple professional groups and service settings, including optical practices, primary health-care facilities, hospitals, and community-based programs. The predominance of optometrists working in optical settings may provide an important opportunity for accessible refractive services and community education, but it also raises questions regarding the extent to which optometrists are integrated into primary eye care, referral pathways, and national eye health programs¹⁹. Understanding the perceived contribution of optometrists and the factors that support or constrain their preventive role is therefore important for informing workforce development and strengthening integrated eye-care services in Indonesia^{20, 21}.

Despite the recognized importance of optometrists in primary eye care, empirical evidence specifically examining the relationship between optometrists' contribution and preventive eye health care in Indonesia remains limited. Existing literature has largely focused on global eye health, refractive error coverage, workforce development, or models of integrated eye care, while fewer studies have quantitatively examined how optometrists themselves perceive their contribution to preventive eye health services and how this contribution is associated with preventive eye-care practices. This gap is particularly important in the context of Indonesia, where strengthening primary and community-based eye care may require greater understanding of professional competencies, service capacity, collaboration, referral mechanisms, public awareness, and health-system integration.

Understanding these factors requires consideration of both measurable relationships and the experiences of optometrists in clinical practice²². A quantitative approach can identify the extent to which professional competence, healthcare system support, and perceived barriers are associated with

the preventive role of optometrists. However, statistical relationships alone may not adequately explain how these factors operate in real-world practice. Qualitative exploration can provide contextual explanations regarding professional experiences, workplace conditions, collaboration, and barriers encountered in delivering preventive eye care¹³. Therefore, a sequential explanatory mixed-methods design, in which qualitative findings are used to further explain the quantitative results, is appropriate for developing a more comprehensive understanding of the preventive role of optometrists in Indonesia.

Accordingly, this study aimed to examine the contribution of optometrists to preventive eye health care in Indonesia and to identify factors associated with the implementation of their preventive role. The findings are expected to provide evidence for strengthening optometric competencies, interprofessional collaboration, referral mechanisms, community engagement, and the integration of optometrists into primary and national eye health services.

METHOD

This study used a quantitative approach with a cross-sectional design. The study involved 97 optometrists from Indonesia as respondents. The study examined the relationship between the contribution or role of optometrists as the independent variable and preventive eye health care as the dependent variable.

The independent variable (X) was the Contribution/Role of Optometrists. This variable represented the contribution of optometrists to eye health services. The dependent variable (Y) was Preventive Eye Health Care. In this study, preventive eye health care was assessed through the implementation of early vision disorder screening and eye health education.

Data were collected using a structured questionnaire distributed to optometrists in Indonesia. Participants were recruited by distributing a structured questionnaire to optometrists working in different regions of Indonesia. The questionnaire was disseminated electronically through professional communication networks and WhatsApp groups of optometrists. This approach was used to facilitate access to optometrists from different geographical areas and practice settings.

The questionnaire included items related to the contribution and role of optometrists in eye health services and the implementation of preventive eye health care. Data were analyzed using SPSS version 20. Descriptive analysis was used to describe the study variables. Pearson correlation analysis was conducted to examine the relationship between the contribution of optometrists and preventive eye health care.

Simple linear regression analysis was performed to determine the statistical contribution of the independent variable to the dependent variable. The regression analysis included the correlation coefficient (R), coefficient of determination (R Square), analysis of variance (ANOVA), regression coefficient (B), standardized coefficient (Beta), t-value, and significance level. Statistical significance was determined at $p < 0.05$.

Ethical approval was obtained from the ARO Gapopin LPPM under approval number 796/S.Kel/ARO GAPOPIN/IX.22/2026. Participation was voluntary, and informed consent, anonymity, and confidentiality were ensured throughout the study.

RESULTS

A total of 97 optometrists from Indonesia participated in this study. Based on their geographical distribution, most respondents were from Jakarta, Banten, West Java, and Lampung, followed by several provinces in Kalimantan. The characteristics and geographical distribution of the respondents are presented in Table 1 below:

Table 1. Characteristics of Respondents

Characteristics	Frequency	Percentage (%)
Age		
20-30 years old	18	18.6
31-45 years old	54	55.7
46-65 years old	25	25.8
Gender		
Male	56	57.7
Female	41	42.3
Last education		
D3	72	74.2
S1	13	13.4
S2	10	10.3
S3	2	2.1
Length of service in practice		
0-5 years	46	47.4
6-10 years	17	17.5
11-15 years	7	7.2
16-20 years	5	5.2
21-25 years	10	10.3
26-30 years	3	3.1
31-35 years	4	4.1
>35 years	2	2.1
No previous practice experience	3	3.1
Workplace		
Optic	70	72.2
Clinic, Hospital, Puskesmas	14	14.4
Education Institute	13	13.4

Based on age, the majority of respondents were aged 31–45 years, accounting for 55.7% ($n = 54$), followed by those aged 46–65 years at 25.8% ($n = 25$) and 20–30 years at 18.6% ($n = 18$). Regarding gender, male respondents constituted the majority, representing 57.7% ($n = 56$), while female respondents accounted for 42.3% ($n = 41$).

Table 1 shows that the respondents were predominantly graduates of Diploma III optometry programs. In terms of professional practice experience, nearly half of the respondents (47.4%, $n = 46$) had 0–5 years of practice experience. Regarding the workplace, most respondents worked in optical practices or optical shops (72.2%, $n = 70$). Overall, the findings demonstrate that the

respondents were predominantly Diploma III optometry graduates, with almost half having relatively short professional practice experience (0–5 years), and most working in optical practice settings.

Table 2. Overview of the Optometrists' Contribution to Preventive Eye Health Services

No	Dimension	Positive response (%)
1.	Optometrists play an important role in providing eye health education to the community	86.5
2.	Early screening for refractive errors is a key component of optometrists' preventive services.	87.5
3.	Optometrists play a role in the early detection of eye diseases.	76
4.	The role of optometrists can reduce the risk of more severe visual impairment.	75
5.	Optometry education provides adequate competencies for preventive eye care services.	77
6.	I have adequate skills to conduct eye health screening.	71.9
7.	The use of diagnostic equipment supports the preventive role of optometrists.	68.8
8.	Collaboration between optometrists and ophthalmologists works well.	60.4
9.	The referral system supports the preventive role of optometrists.	65.6
10.	The role of optometrists in primary care services needs to be strengthened.	67.7
11.	Optometrists should be more actively involved in national eye health programs.	80.2
12.	Current regulations limit the role of optometrists in preventive eye care services.	33.3
13.	Limited public understanding affects the optimization of the role of optometrists.	55.2
14.	Preventive optometric services have the potential to reduce the burden of visual impairment.	56.3
15.	Strengthening the role of optometrists can improve access to eye health services.	76

The findings showed a generally positive perception of optometrists' contribution to preventive eye health services. The highest positive responses were related to early refractive error screening (87.5%), community eye health education (86.5%), and greater involvement in national eye health programs (80.2%). Positive responses were also observed regarding the adequacy of optometry education (77.0%), screening skills (71.9%), and the use of diagnostic equipment (68.8%). Lower responses were reported for collaboration with ophthalmologists (60.4%), referral systems (65.6%), and the need to strengthen the role of optometrists in primary care (67.7%). Limited public understanding was reported as a relevant barrier by 55.2% of respondents, while 33.3% perceived current regulations as restrictive. Regarding potential outcomes, 75.0% perceived that optometrists could reduce the risk of severe visual impairment, 76.0% associated their strengthened role with improved access to eye health services, and 56.3% perceived a potential reduction in the overall burden of visual impairment.

Table 3. Relationship between the Contribution of Optometrists and Preventive Eye Health Care

Variable	1	2
Preventive Eye Health Care	1	0.919
Contribution of Optometrists	0.919	1
p-value	<0.001	<0.001
N	97	97

Table 3 shows a strong positive correlation between the contribution of optometrists and preventive eye health care ($r = 0.919$, $p < 0.001$). This finding indicates that a higher contribution of optometrists was associated with a higher level of preventive eye health care implementation.

Table 4. Model Summary of the Contribution of Optometrists to Preventive Eye Health Care

Model	R	R square	Adjusted Square	R	Std.error of estimate
1	0.919	0.845	0.843		0.329

Predictor: Contribution of Optometrists

Dependent Variable: Preventive Eye Health Care

As shown in Table 4, the regression model demonstrated a strong relationship between the contribution of optometrists and preventive eye health care ($R = 0.919$). The contribution of optometrists statistically explained 84.5% of the variance in preventive eye health care ($R^2 = 0.845$).

Table 5. Simple Linear Regression Analysis of the Contribution of Optometrists to Preventive Eye Health Care

Variable	B	SE	Beta	t	p-value
Constant	0.260	0.200	-	1.299	0.197
Contribution of optometrists	0.963	0.042	0.919	22.724	<0.001

Table 5 presents the results of the simple linear regression analysis. The regression model was statistically significant ($F = 516.380$, $p < 0.001$). The contribution of optometrists was positively and significantly associated with preventive eye health care ($B = 0.963$, $SE = 0.042$, $Beta = 0.919$, $t = 22.724$, $p < 0.001$). The model explained 84.5% of the variance in preventive eye health care ($R^2 = 0.845$). The regression equation was $Y = 0.260 + 0.963X$.

DISCUSSION

The present study involved 97 optometrists from Indonesia, with the largest proportion of respondents aged 31–45 years (55.7%), followed by those aged 46–65 years (25.8%) and 20–30 years (18.6%). This distribution indicates that the study predominantly involved optometrists who were in the early to middle stages of their professional careers. The relatively large proportion of respondents aged 31–45 years may be relevant to the interpretation of the findings because professional experience can influence

exposure to patients, clinical decision-making, preventive practices, and familiarity with the broader eye care system.

Almost half of the respondents (47.4%) had 0–5 years of professional practice experience. At the same time, the sample also included optometrists with more than 20 years of experience. This combination provides perspectives from both relatively new practitioners and more experienced professionals. However, because the sample was obtained through professional networks and voluntary participation, the distribution should not be interpreted as representative of the entire optometrist workforce in Indonesia. The geographical concentration of respondents in Jakarta, Banten, West Java, and Lampung, with additional respondents from several provinces in Kalimantan, also indicates that regional representation was uneven.

The educational profile was dominated by Diploma III (D3) graduates (74.2%), whereas only 13.4% had a bachelor's degree, 10.3% a master's degree, and 2.1% a doctoral degree. This finding is important when considering the development of optometric competencies in Indonesia. The WHO Eye Care Competency Framework emphasizes that an effective eye care workforce requires competencies that are aligned with population needs and that workforce development should extend across different levels of care. The framework includes not only clinical practice but also professionalism, learning and development, management and leadership, community and advocacy, and evidence-related competencies ²³.

The predominance of D3 graduates may therefore reflect the historical educational structure of optometry in Indonesia, while also highlighting the importance of continuing professional development and competency enhancement. Importantly, educational qualification alone should not be interpreted as an indicator of preventive-care performance. Competency is influenced not only by formal education but also by clinical experience, continuing education, workplace support, scope of practice, access to equipment, referral systems, and opportunities for interprofessional collaboration.

The workplace distribution provides another important context. Most respondents (72.2%) worked in optical practices, whereas 14.4% worked in clinics, hospitals, or puskesmas, and 13.4% worked in educational institutions. This distribution suggests that the current contribution of optometrists to preventive eye health in the sample is predominantly situated within optical practice rather than formal primary health-care settings. This finding is particularly relevant to the concept of integrated people-centred eye care (IPEC) promoted by WHO. IPEC emphasizes continuity of eye care across levels and settings, including promotion, prevention, treatment, and rehabilitation, and requires coordination across health-care providers and sectors ¹⁴. Therefore, strengthening preventive eye care may require greater integration of optometric services with primary health-care facilities and referral networks rather than limiting preventive activities to optical practice.

Optometrists' Contribution to Preventive Eye Health Services

The descriptive findings demonstrate that respondents generally perceived optometrists as having an important role in preventive eye health services. The highest positive response was related to early

screening for refractive errors (87.5%), followed by community eye health education (86.5%). These findings are consistent with the broader concept of primary eye care, in which early identification of visual problems and appropriate referral constitute important components of prevention and early intervention.

The high proportion of respondents recognizing refractive-error screening is particularly meaningful because uncorrected refractive error remains an important contributor to avoidable vision impairment. WHO identifies refractive error as one of the major areas in which effective eye-care coverage needs to be strengthened globally, with a specific global target to increase effective refractive-error coverage by 40 percentage points by 2030¹⁴. From a primary-care perspective, optometrists may occupy an important position because refractive assessment is closely related to routine vision assessment and can provide an opportunity to identify individuals who require further examination. Primary eye care has also been described as having the potential to address uncomplicated refractive problems and establish referral pathways for specialist services²⁴.

The high response concerning community eye health education (86.5%) also supports the preventive and health-promotion dimensions of optometric practice. Preventive eye health does not depend exclusively on clinical examination; it also requires individuals and communities to recognize symptoms, understand risk factors, seek appropriate care, and comply with referral or treatment recommendations. A scoping review of community engagement in eye care in low- and middle-income countries found that community involvement has been used in health promotion, education, screening, detection, referral, and navigation of eye-care pathways¹⁶. Thus, the present findings suggest that respondents viewed the optometrist not only as a provider of refractive services but also as a potential health educator and first point of contact within the eye-care pathway.

The findings concerning early detection of eye diseases (76.0%) and the potential of optometrists to reduce the risk of more severe visual impairment (75.0%) further support this interpretation. However, these results should be understood as respondents' perceptions of professional contribution rather than direct evidence that optometric services independently reduce visual impairment. Because the present study used a cross-sectional self-reported design, the findings cannot establish whether higher optometrist contribution actually results in lower population-level visual impairment. This distinction is important because WHO emphasizes that reducing avoidable vision impairment requires a continuum of interventions extending from prevention and early detection to treatment and rehabilitation¹⁴. Therefore, the role of optometrists should be considered as one component within a broader eye-care system rather than as an isolated determinant of visual outcomes.

Professional Competence and Preventive Eye Care

The findings showed relatively positive perceptions regarding professional competence. Approximately 77.0% of respondents agreed that optometry education provided adequate competencies for preventive eye-care services, while 71.9% reported having adequate skills to conduct eye-health screening. These findings can be interpreted using the competency-based health workforce perspective. According to

the WHO Eye Care Competency Framework, effective eye-care delivery requires a workforce whose competencies are aligned with population needs. The framework encompasses clinical practice as well as professionalism, community and advocacy, evidence, leadership, and continuing learning ²³.

The relatively high response regarding educational adequacy indicates that respondents generally perceived their formal education as providing a foundation for preventive practice. Nevertheless, the slightly lower percentage reporting adequate screening skills (71.9%) suggests that formal education and perceived practical competence may not always be identical. This distinction is important because preventive eye-care competencies require opportunities for repeated practice, exposure to different patient populations, access to appropriate equipment, supervision, and continuing professional development. WHO's guide for applying the Eye Care Competency Framework specifically emphasizes adapting competency development to local contexts and using the framework to support competency-based curricula and workforce development ²³. Consequently, the findings may support the need for continuing education and competency development, particularly in screening, early detection, patient education, referral decision-making, and interprofessional communication. Such development could help bridge the gap between theoretical preparation and practical preventive service delivery.

Diagnostic Equipment and Service Capacity

A total of 68.8% of respondents agreed that the use of diagnostic equipment supports the preventive role of optometrists. Although this represents a majority, the percentage was lower than that observed for refractive-error screening and health education. This difference may indicate that professional contribution is not determined solely by the practitioner's knowledge or skills. Preventive care also depends on the availability of appropriate equipment and the organizational environment in which services are delivered. The WHO Eye Care Competency Framework recognizes that workforce capacity must be considered together with the systems in which eye-care professionals operate. WHO has emphasized that challenges to eye-care delivery include inadequate workforce capacity, mismatch between workforce skills and population needs, and insufficient integration of eye care within health systems ¹⁵.

Interprofessional Collaboration and Referral Systems

One of the important findings in Table 2 was that only 60.4% of respondents perceived collaboration between optometrists and ophthalmologists as working well. Similarly, 65.6% perceived that the referral system supported the preventive role of optometrists. These percentages were lower than those observed for refractive-error screening and community education. This pattern suggests that respondents were more confident about the individual clinical contribution of optometrists than about the system-level integration of their role. This finding is highly relevant to the IPEC framework. WHO emphasizes that integrated eye care requires coordination across different levels and sites of care, rather than isolated service delivery ¹⁴. A recent scoping review of eye-care integration in low- and middle-income settings similarly found that integration was associated with relationship-building and service coordination, while inadequate referral and information systems represented important barriers ¹⁸.

The present finding therefore suggests that improving preventive eye care in Indonesia may require stronger collaboration between optometrists, ophthalmologists, primary-care providers, and other relevant health professionals. A functional referral system is particularly important because optometrists may identify patients who require further ophthalmic assessment. Evidence from optometric practice has shown that routine eye examinations can identify asymptomatic patients with ocular pathology or risk requiring ophthalmological consultation ²⁵. In this context, referral should not be regarded as a limitation of optometric practice but as an essential component of an integrated care pathway. The WHO's more recent Competency-based Refractive Error Teams framework also emphasizes clearly defined roles, coordinated practice, and collaboration across community, primary, secondary, and tertiary levels of care ¹⁷.

Strengthening the Role of Optometrists in Primary Care

The finding that 67.7% of respondents agreed that the role of optometrists in primary care needs to be strengthened is consistent with the lower responses concerning collaboration and referral systems. This finding may reflect a gap between the potential contribution of optometrists and their current integration into the broader health system. Although most respondents worked in optical practices, respondents nevertheless recognized the need for greater involvement in primary care. The WHO World Report on Vision recommends stronger integration of eye care into national health systems, including primary health care, to improve prevention, early detection, treatment, and rehabilitation ¹⁴. WHO's subsequent guidance similarly emphasizes that eye care should be integrated into health-system planning rather than implemented as a separate service ²³.

The present findings therefore suggest that expanding preventive eye care may require a shift from a predominantly optical-service-oriented model toward a more integrated model in which optometrists can participate in community screening, health promotion, early identification, referral, and follow-up within appropriate primary-care pathways. This interpretation is also supported by evidence from Southeast Asia. A regional analysis found that achieving universal eye health coverage through integrated people-centred eye care would require substantial strengthening of eye-care facilities and the health workforce ²⁶.

Public Understanding as a Barrier

More than half of the respondents (55.2%) agreed that limited public understanding affected the optimization of the role of optometrists. This finding highlights that preventive eye care is influenced not only by professional capacity but also by community awareness and health-seeking behaviour. Health education is particularly important because preventive services require individuals to recognize the importance of routine eye examinations and seek care before significant visual problems occur. WHO's IPEC model explicitly includes empowering and engaging people and communities as one of its core strategies ¹⁴. The relatively high percentage of respondents who identified public understanding as a barrier is therefore consistent with the broader concept of people-centred care. Community members should not be regarded merely as passive recipients of services but as active participants in maintaining their eye health.

Previous research on community engagement in low- and middle-income countries indicates that community participation can support health promotion, screening, detection, referral, and navigation of eye-care services, although the effectiveness of community engagement depends on context and implementation¹⁸. Thus, the role of optometrists in preventive eye health may extend beyond examination and correction of refractive errors to include structured community education regarding the importance of eye examinations, visual symptoms, risk factors, appropriate referral, and preventive behaviours.

Regulatory Context and the Role of Optometrists

Interestingly, only 33.3% of respondents agreed that current regulations limit the role of optometrists in preventive eye-care services. This was one of the lowest positive-response percentages in Table 2. This finding suggests that, within this sample, respondents did not perceive regulatory restrictions as the dominant barrier to preventive practice. Instead, the findings point more strongly toward collaboration, referral systems, primary-care integration, equipment, and public understanding as areas requiring attention. However, this result should be interpreted carefully. A low perception of regulatory barriers does not necessarily mean that the regulatory framework is fully supportive of all forms of preventive eye care. Perceptions of regulation may vary according to workplace, professional experience, geographical context, and individual understanding of the scope of practice. Therefore, regulatory issues should ideally be examined alongside formal policy documents and professional standards rather than relying solely on practitioner perceptions.

Potential Impact on Access to Eye Health Services

The study found that 76.0% of respondents agreed that strengthening the role of optometrists could improve access to eye-health services. This finding is consistent with the principles of primary and integrated eye care, particularly because access to eye care depends on the availability and distribution of an appropriately skilled workforce. WHO emphasizes that global eye-care systems continue to face challenges involving unequal access, workforce shortages, and insufficient integration of eye care into health systems¹⁴. The geographic distribution of respondents in the current study, together with the predominance of optical practice as the workplace, also suggests that optometrists may represent an existing workforce that could potentially be more systematically incorporated into preventive eye-care pathways. However, the present study did not measure geographical service coverage or actual patient access. Therefore, the finding should be interpreted as a perceived potential to improve access, rather than direct evidence that strengthening optometric roles has already improved access.

Perceived Contribution and the Burden of Visual Impairment

An interesting finding was the difference between respondents' perceptions regarding individual preventive outcomes and the broader burden of visual impairment. While 75.0% agreed that optometrists could reduce the risk of more severe visual impairment, only 56.3% agreed that preventive optometric services had the potential to reduce the overall burden of visual impairment. This difference is theoretically important. It may indicate that respondents recognized the role of optometrists at the individual patient level

more strongly than their ability to influence population-level outcomes. Reducing population-level visual impairment requires more than individual screening or refractive correction. It depends on the availability of services, affordability, treatment uptake, referral completion, continuity of care, management of ocular diseases, and broader health-system capacity. WHO therefore frames vision care as a continuum extending across promotion, prevention, treatment, and rehabilitation^{14, 18}. The relatively lower response of 56.3% may consequently reflect an awareness that optometrists represent one component of a much larger system. This interpretation is consistent with evidence showing that integration of eye care into health systems is complex and affected by workforce capacity, competing priorities, referral mechanisms, financing, and service coordination¹⁸.

Association Between Optometrists' Contribution and Preventive Eye Health Care

The principal quantitative finding of this study was the very strong positive correlation between optometrists' contribution and preventive eye health care ($r = 0.919$, $p < 0.001$). This result indicates that higher scores on the contribution of optometrists were statistically associated with higher scores on preventive eye health care. The statistical significance indicates that the observed association was unlikely to be explained by random sampling variation alone within this sample. The finding is conceptually consistent with the WHO Eye Care Competency Framework, which positions the eye-care workforce as an important component of delivering effective eye-care services. The framework links workforce competencies and activities to the delivery of eye care across different levels of the health system¹⁵. The result is also consistent with the IPEC approach, which emphasizes coordinated workforce participation, primary care, community engagement, and continuity across levels of care¹⁴. However, the magnitude of the correlation ($r = 0.919$) requires careful interpretation. Such a high correlation may partly reflect the conceptual proximity between the constructs measured in the questionnaire. Several items in Table 2 directly describe optometrists' preventive activities, while the outcome construct also concerns preventive eye health care. Consequently, some degree of measurement overlap may contribute to the strength of the observed association.

Furthermore, both variables were derived from self-reported responses collected from the same participants at the same point in time. This raises the possibility of common-method or response-related effects, whereby respondents' general perceptions of the importance of optometry could influence their responses across related items. Therefore, the finding should not be interpreted as demonstrating that increasing the contribution of optometrists would necessarily cause a proportional increase in preventive eye-health outcomes. Rather, it demonstrates a strong statistical association between the two constructs within the study population.

Regression Analysis and Interpretation of R^2

The regression analysis produced an R value of 0.919 and an R^2 of 0.845, indicating that the contribution of optometrists statistically accounted for 84.5% of the variance in the measured preventive eye health care outcome. The regression coefficient was positive and statistically significant ($B = 0.963$,

SE = 0.042, $\beta = 0.919$, $t = 22.724$, $p < 0.001$). The model was also statistically significant ($F = 516.380$, $p < 0.001$), with the regression equation: $Y = 0.260 + 0.963X$. Statistically, this indicates that a one-unit increase in the contribution score was associated with an estimated 0.963-unit increase in the preventive eye health care score within this model. Nevertheless, the value of $R^2 = 0.845$ should not be interpreted as evidence that optometrists' contribution independently causes 84.5% of preventive eye health care. The appropriate interpretation is that the predictor and outcome demonstrated substantial shared variance in the present dataset. Several factors may explain the high explanatory value. First, the two constructs are theoretically closely related. Second, the measures were collected from the same respondents using self-reported questionnaire data. Third, the cross-sectional design prevents establishing temporal precedence between the predictor and outcome.

The high R^2 should therefore be presented as an important finding while simultaneously acknowledging the possibility of construct overlap and common-method effects. This cautious interpretation is particularly important for a health-services study because preventive eye care is inherently multidimensional and depends on professional competencies, organizational capacity, referral systems, public awareness, financing, policy, and integration with primary care.

Implications for Preventive Eye Care in Indonesia

Taken together, the findings suggest that the contribution of optometrists should be considered within a broader health-system framework rather than as an isolated professional activity. Three levels of intervention can be identified from the findings: First, the professional level involves strengthening competencies in refractive-error screening, early detection, patient education, communication, referral decision-making, and continuing professional development. This is consistent with the WHO Eye Care Competency Framework, which emphasizes competency development across clinical, community, professional, leadership, and evidence domains¹⁵. Second, the service-delivery level involves improving diagnostic capacity, referral mechanisms, collaboration with ophthalmologists, and integration with primary health care. The relatively lower scores for collaboration (60.4%) and referral support (65.6%) indicate that these areas may require particular attention within the context of the present sample. Third, the community and health-system level involves increasing public awareness and integrating optometrists into broader national eye-health initiatives. The 80.2% response supporting greater optometrist involvement in national eye-health programs indicates substantial professional recognition of the potential value of such participation. This interpretation is aligned with WHO's IPEC model, which emphasizes community engagement, reorientation toward primary care, coordination across sectors, and creation of an enabling environment¹⁴.

Study Strengths and Limitations

One strength of this study is that it provides empirical information on Indonesian optometrists' perceptions of their contribution to preventive eye health, an area that has received relatively limited attention in the Indonesian context. The study also combines descriptive findings with correlation and

regression analyses, allowing the relationship between optometrists' contribution and preventive eye health care to be examined quantitatively. However, several limitations should be considered. First, the cross-sectional design prevents conclusions regarding temporal relationships or causality. The observed association between optometrists' contribution and preventive eye health care should therefore not be interpreted as evidence that one variable causes changes in the other. Second, the study relied on self-reported questionnaire data. Respondents may have provided socially desirable responses or may have evaluated their professional contribution positively. Third, the sample size was relatively modest ($n = 97$) and recruitment was based on voluntary participation through professional networks, resulting in uneven geographical representation. Consequently, the findings should not be generalized directly to all optometrists in Indonesia. Fourth, the very strong correlation and high R^2 may partly reflect conceptual similarity or measurement overlap between the contribution and preventive-care constructs. Future studies should consider using more distinct operational definitions, objective service indicators, patient-level outcomes, or multi-source data. Finally, because the study did not directly measure population-level changes in visual impairment, service utilization, referral completion, or effective coverage, the findings cannot establish whether optometrists' contribution produces measurable reductions in visual impairment at the population level.

CONCLUSIONS AND RECOMMENDATIONS

This study demonstrates a strong positive association between the contribution of optometrists and preventive eye health care among optometrists in Indonesia ($r = 0.919$, $p < 0.001$), with the regression model accounting for 84.5% of the variance in the measured preventive eye health care score. Optometrists were perceived to have an important role particularly in early refractive error screening, community eye health education, early detection of eye diseases, and improving access to eye health services. However, several areas require further strengthening, particularly interprofessional collaboration, referral systems, integration into primary care, diagnostic capacity, public understanding, and involvement in national eye health programs. Given the cross-sectional and self-reported design, these findings indicate a strong association rather than a causal relationship.

It is recommended that stakeholders strengthen the contribution of optometrists through competency development, continuing professional education, improved access to appropriate diagnostic equipment, and stronger collaboration and referral mechanisms with ophthalmologists and primary health-care providers. Greater integration of optometrists into community-based and primary eye-care programs may also support broader access to preventive eye health services. Future research should involve larger and more geographically representative samples and consider longitudinal designs, objective service indicators, patient-level outcomes, and multi-source data to further examine how optometric services contribute to preventive eye health and the reduction of

avoidable visual impairment in Indonesia.

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