

Systematic Review

Barriers and enablers to diabetic retinopathy screening uptake: a systematic literature review

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ABSTRACT

Diabetes mellitus is a growing worldwide health concern with fast-rising prevalence and serious health complications. Early detection through routine Diabetic retinopathy screening is effective in preventing vision loss. Objective: The study sought to identify factors that hinder and promote uptake of diabetic retinopathy screening. This study followed PRISMA to conduct and report findings. Relevant literature was identified; data were extracted, summarized in a table and analyzed. References were cited using EndNote. Diabetic retinopathy screening uptake in low- and middle-income countries, especially in sub-Saharan Africa, was consistently low. Studies from Malawi, and Kenya reported screening rates ranging from 10.5% to 25.6%, with annual uptake between 13.3% and 20%. This demonstrates a substantial gap between recommended screening guidelines and actual practice. Knowledge of Diabetic retinopathy screening services by patients and referral by healthcare workers were the strongest predictors of screening uptake. In Kenya, higher education level, family history of diabetes and provider referral were associated with increased screening utilization. Worldwide evidence reveals marked inequities in DR screening adherence, with higher uptake in developed countries at around 66% compared to less developed ones at approximately 39%. Europe observed the highest adherence to screening at 81.3%. Studies indicate that diabetic retinopathy screening uptake remains suboptimal, highlighting the need for integrated diabetes and eye care services, provider-initiated referrals, and enhanced patient awareness to improve screening coverage. The role of data management systems in DR screening reporting, monitoring, and evaluation remains underexplored in many studies.

Keywords: Diabetes, Retinopathy, Barriers, Factors, Enablers, Screening uptake

INTRODUCTION

Diabetes Mellitus is a common metabolic disorder that manifests with sustained high blood glucose levels resulting from impaired insulin production or reduced insulin sensitivity. If left uncontrolled, over time it can result to organ damage involving the kidneys, blood vessels, eyes, and peripheral nervous system.¹ More than 500 million people worldwide are estimated to be living with diabetes with projections showing a marked rise by 2050.¹

Globally, the number of people affected by diabetic retinopathy continues to rise respectively with increasing prevalence of Diabetes. Recent studies suggest that over 100 million people had diabetic retinopathy by 2020 with a considerable proportion being at risk of visual loss.² The retinal vasculature of the eye is very sensitive to prolonged high blood glucose which results to vascular damage leading to leakage of blood and fluid into retinal tissue.³ Recent studies done in Africa demonstrates diabetic retinopathy as an important cause of blindness among working class with consequent projected increase

in vision loss.⁴ In Kenya, studies have shown that approximately 1/3 of the population living with diabetes have diabetic retinopathy in which 10% is vision threatening diabetic retinopathy.⁵

One big challenge is that diabetic retinopathy is often asymptomatic in early stages making many patients to seek medical attention when vision is impaired. Therefore, routine screening is essential for timely diagnosis and prevention of avoidable blindness.⁵ Several screening methods are currently available including optical coherence tomography, dilated fundus exam, retina photography and other emerging innovations like artificial intelligence based retinal imaging.³ Health systems place emphasis on diabetic retinopathy screening across health facility levels, however, the increasing burden of diabetes is overwhelming the existing medical infrastructure resulting to low percentage of patients who get screened for diabetic retinopathy.⁶

Patient awareness of diabetic retinopathy threat to vision and physician referral of diabetes patients for screening is key to increasing diabetic retinopathy screening levels.⁷ This study sought to identify challenges and facilitators to diabetic retinopathy screening uptake through systematic literature review. The study specific objectives were; evaluating barriers of diabetic retinopathy screening. Assessing enablers of diabetic retinopathy screening. Identify patient and health system gaps that should be improved to increase diabetic retinopathy screening outcome.

METHODS

This study followed PRISMA to identify and report the review.⁸ This review sought to identify factors that hinder and promote uptake of diabetic retinopathy screening. Relevant studies were selected; data were extracted, summarized in a table and analyzed. References were cited using EndNote.

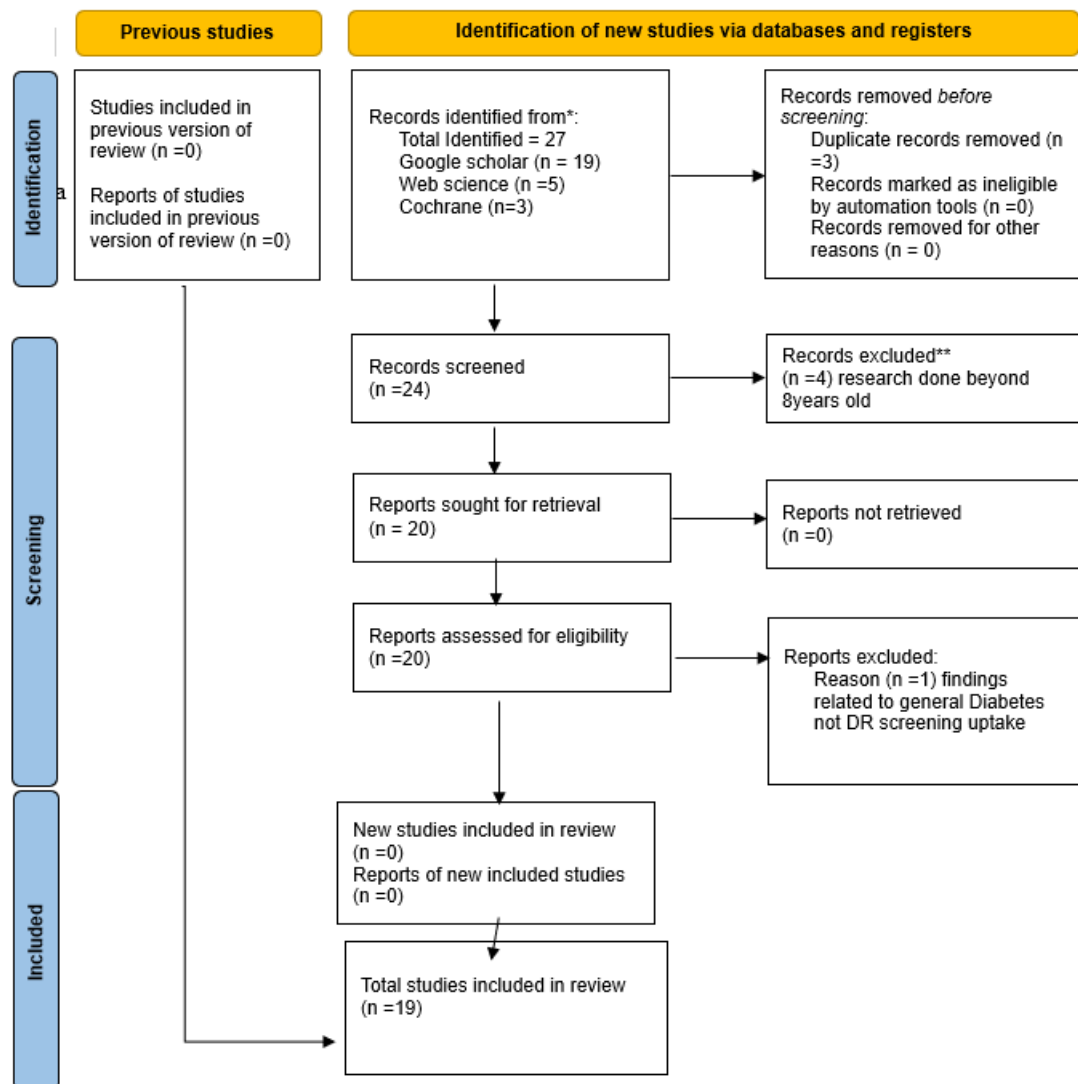


Figure 1: PRISMA 2020 statement.

Research question

This study adopted the following research question: “What barriers and enablers to diabetic retinopathy screening influence the uptake of diabetic retinopathy screening?”

Strategy and selection criteria

Literature was searched using Google Scholar, Cochrane, and Web of Science to seek relevant publications on diabetic retinopathy screening. The search employed Boolean terms that included: “enablers to diabetic retinopathy screening”, “barriers to diabetic retinopathy screening”, “uptake of diabetic retinopathy screening”, “factors influencing uptake”. A combination of Boolean terms was also used to capture relevant articles. Retrieved articles were screened based on relevance to study objectives, while references were managed using EndNote and Vancouver. Since we didn't have a tool to apply supernumeric, we manually entered them.

A total of 27 studies were identified as follows: Google Scholar=19, Cochrane=5 and Web of Science=3. 24 studies were screened after removing duplicates. During screening, 5 studies were removed as they were over 8 years old and not relevant to the study. Thus, 19 studies were included for review. This process was done carefully using PRISMA 2020. See Figure 1. Reviewed studies were analyzed using a table format for type of research, methods used in study and findings. To maintain data quality, 1st and 2nd reviewers were drawn from the authors.

RESULTS

From the reviewed studies, adherence to DR screening was found to still be low in lower economy countries in Africa despite the overwhelming evidence that screening prevents vision loss. Evaluation of facility-based studies conducted in Malawi, Kenya, and Nairobi County showed that uptake of DR screening was very low, ranging from 10.5% to 25.6%, with an annual uptake of 13.3% to 20% per year. These results indicate that there is a large gap between the recommended screening guidelines and actual practice among diabetic patients.

Some of studies reviewed showed that awareness and referral-related factors were the strongest predictors to DR screening uptake. Knowledge of availability to DR screening services and previous referral by a healthcare provider had very strong associations with DR screening uptake, with odds ratios of more than 9. In Kenyan setting, education level, family history of diabetes and referral by a healthcare provider were associated with higher use of screening services.

Review of studies provided evidence of large inequities in the world regarding adherence towards DR screening. High income countries reported better adherence to

diabetic retinopathy screening than in low- and middle-income countries (39.3%), with the highest rates found in Europe (81.3%). The study likewise indicated that health system capacity has an important role in the accessibility and use of screening services.

DISCUSSION

Analyzed studies constantly showed that Sub-Saharan Africa had lower screening uptake for diabetic retinopathy.⁴ Utilization rate of this critical service in Malawi and Nairobi Kenya ranged between 10.5% and 25.6% which means there exist a big gap in order to reach recommended screening targets where every diabetic patient should undergo DR screening at least once in a year.⁵ Similar low uptake rates have also been reported in studies conducted in Nigeria and Ethiopia, where poor access to eye care services, inadequate awareness and financial constraints were identified as major barriers to regular screening.⁹⁻¹¹ These findings collectively suggest that low screening uptake is a widespread challenge across many low- and middle-income countries within the region. In contrast, studies from high-income countries such as the United Kingdom and Australia have reported significantly higher screening uptake rates exceeding 70%, largely attributed to well-established national diabetic retinopathy screening programs, better healthcare infrastructure, universal health coverage and integrated referral systems.^{12,13} The differences observed between Sub-Saharan Africa and developed settings may therefore be explained by disparities in healthcare financing, availability of trained ophthalmic personnel, accessibility of screening facilities and public health awareness campaigns.

Identified enablers to diabetic retinopathy screening uptake included; patient awareness as regards to availability of screening service for DR, referral by healthcare practitioners, family history of diabetes and higher education showed strong relationship with increase in screening uptake.¹ Among the enablers, Health Practitioner referral was the strongest predictor to screening uptake.¹⁴ Similar findings were reported, who observed that patients with higher educational levels and better knowledge of diabetic eye complications were more likely to seek screening services.¹⁵ This finding aligns with studies conducted in South Africa and Tanzania, which demonstrated that physician recommendation significantly influenced patients' decisions to attend retinal screening appointments.¹⁶ However, some studies in rural settings reported that even when referrals were provided, uptake remained low due to long travel distances, transportation costs and limited availability of specialized eye care services.^{17,18} Such differences may be attributed to variations in healthcare accessibility, socioeconomic status and the strength of referral systems across different regions. Overall, these findings emphasize the importance of strengthening patient education, healthcare worker involvement and

healthcare system integration to improve diabetic retinopathy screening uptake in Sub-Saharan Africa.

Equally, studies found major challenges as; low patient awareness, weak referral pathways, inadequate integration of eyecare into diabetes services, low health literacy and health systems challenges.⁹ Similar findings have been reported in studies conducted in Ethiopia, Tanzania, and Nigeria, where limited knowledge about diabetic eye complications and lack of routine referral systems significantly contributed to poor screening attendance among diabetic patients.^{9,11} In many Sub-Saharan African settings, eye care services are often poorly integrated into primary diabetes care, resulting in missed opportunities for early detection and timely management of diabetic retinopathy. Furthermore, shortages of trained ophthalmic personnel, inadequate diagnostic equipment, and financial barriers continue to hinder effective implementation of screening programs.

Looking at studies done globally, there is big disparity in compliance to screening between low- and middle-income countries versus developed nations highlighting the need to strengthen infrastructure that can enhance screening including the integration of artificial intelligence and the establishment of organized screening systems to improve access and utilization of screening services.¹ Comparable studies from the United Kingdom, Singapore, and Australia have demonstrated significantly higher screening adherence rates due to the existence of structured national screening programs, electronic referral systems, teleophthalmology services, and strong healthcare financing mechanisms.^{12,13} In contrast, low-resource settings often face fragmented healthcare systems and limited technological capacity, which contribute to delayed diagnosis and lower screening coverage. The differences between these settings may therefore be explained by variations in healthcare infrastructure, government investment in chronic disease management, availability of digital health technologies, and public awareness initiatives.

To address these challenges, it requires multisectoral approach that emphasizes on promoting provider-initiated referrals, integrating eyecare into diabetes services, enhanced patient education and strengthening health systems will improve diabetic retinopathy screening services.¹⁹ Similar recommendations have been proposed in studies from South Africa and India, where integrated diabetes and eye care models were associated with improved screening attendance and earlier detection of retinal complications.¹⁶ Additionally, the adoption of telemedicine and artificial intelligence-assisted retinal imaging has shown promise in improving screening efficiency and expanding access in underserved areas. However, successful implementation of such interventions in low-income settings may be limited by inadequate funding, poor internet connectivity, and insufficient technical expertise. Therefore, sustainable policy support, healthcare workforce training, and

investment in digital health infrastructure are essential to bridge the gap in diabetic retinopathy screening services between developing and developed countries.

CONCLUSION

Studies have shown that diabetic retinopathy screening uptake is still suboptimal, suggesting improvement in health service integration with eye care, provider-initiated referrals, and patient awareness about diabetic retinopathy screening as key strategies to improve screening coverage. However, many studies still have not explored the importance of data management system in reporting, monitoring and routine evaluation of DR screening services in order to track indicators.

Recommendations

Standardize screening and referral protocols and reminders for diabetic retinopathy screening to scale up screening uptake. Continuous facility and community-based health education should be conducted to increase awareness of patients on importance of early diabetic retinopathy screening and potential visual impairing complications. Create vigorous electronic or standardize data management systems for documentation, reporting and tracking screening services for diabetic retinopathy including mobile health reminders to aid in evidence-based decisions. Incorporate key performance indicators into national diabetic and eye health programs in order to evaluate diabetic retinopathy screening program. Health care workers require continuous professional training on current screening guidelines, referral pathways, documentation and data use. Stakeholders and Government need to allocate resources towards equipment, human resources and data management systems in diabetic retinopathy screening programs. Conduct studies on importance of data management system in reporting, monitoring and routine evaluation of DR screening services.

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