REVIEW ARTICLE

Journal of the ASEAN Federation of Endocrine Societies

Addressing Unmet Needs in the Management of Diabetes in Asia and Enhancing Diabetes Care Through the Use of Digital Technology: An Expert Opinion

Daphne SL Gardner,[1] Julia K. Mader,[2] Sanjay Kalra,[3] Irene Kopp,[4] Banshi Saboo,[5] Kazuhiro Sugimoto,[6,7] Michael Villa,[8] Shailendra Bajpai[9]

[1]*Department of Endocrinology, Singapore General Hospital, Singapore*
[2]*Division of Endocrinology and Diabetology, Medical University of Graz, Graz, Austria*
[3]*Department of Endocrinology, Bharti Hospital, Karnal, India*
[4]*Nepean Diabetes Service, Nepean Hospital, Kingswood, Australia*
[5]*Diacare-Diabetes Care and Hormone Clinic, Ahmedabad, India*
[6]*Diabetes Centre, Ohta Nishinouchi Hospital, Koriyama, Japan*
[7]*JURI Medical Corporation, SUGIMOTO Internal Medicine and Diabetes Clinic, Fukushima, Japan*
[8]*Internal Medicine, St. Luke's Medical Center Global City, Taguig, Philippines*
[9]*Embecta Asia, Singapore*

Abstract

Background. Asia faces a growing diabetes burden compounded by low awareness, limited access, affordability concerns, and heterogeneous care practices. These challenges hinder consistent management across the region.

Methodology. An expert panel representing India, Japan, South Korea, the Philippines, Singapore, Australia and Austria reviewed regional barriers, compared national practices, and proposed feasible strategies for improvement.

Results. Key gaps included healthcare access, affordability, limited workforce capacity, poor adherence to guidelines, cultural influences and underuse of digital tools. Experts examined region-specific approaches, highlighting effective models from Singapore, India, Japan, the Philippines, China, Malaysia, Indonesia, Thailand and South Korea.

Discussion. Synthesised insights yielded policy-oriented and practical recommendations, focusing on insurance expansion, digital and AI-enabled care, workforce strengthening, and community-based programs to enhance diabetes care delivery.

Conclusion: Tailored, region-specific and technology-enabled strategies addressing systemic and economic barriers are vital to strengthen diabetes management across Asia.

Key words: Asia, telemedicine; diabetes mellitus type 2, integrated healthcare, mhealth, artificial intelligence, diabetes monitoring, healthcare policies

INTRODUCTION

Diabetes has emerged as one of the most urgent health concerns in Asia, home to nearly 60% of the global diabetes burden.[1] The prevalence of diabetes has surged in recent decades, driven by rapid urbanisation, sedentary lifestyles, unhealthy dietary habits, and genetic predisposition. The International Diabetes Federation (IDF) estimates that by 2045, in Southeast Asia alone, the number of adults living with diabetes, which was approximately 90 million in 2021, is projected to reach around 152 million by 2045.[2]

Despite advancements in diabetes care, the region continues to face significant healthcare disparities. Most low- and middle-income countries (LMICs) are in Asia, where diabetes care is fragmented, leading to inconsistent treatment approaches.[3,4] Healthcare systems are often overburdened, with limited access to diabetes specialists and endocrinologists, particularly in rural and remote areas.[5] A large proportion of people with diabetes (PwD) remain undiagnosed, mainly due to inadequate screening programmes, low health literacy, and financial constraints.[6–8] As a result, many individuals receive a

eISSN 2308-118x (Online)
Printed in the Philippines

Received: August 19, 2025. Accepted: October 10, 2025.
Published online first: February 25, 2026.
https://doi.org/10.15605/jafes.041.01.5209

Corresponding author: Daphne S.L. Gardner, MD
Senior Consultant, Department of Endocrinology,
Singapore General Hospital, Outram Road, Singapore-169608
Tel. No.: 63214654
E-mail: daphne.gardner@singhealth.com.sg
ORCiD: https://orcid.org/0000-0001-5349-7442

diagnosis only after complications have developed, leading to a higher incidence of diabetes-related complications, including cardiovascular disease, diabetic retinopathy (DR), nephropathy and neuropathy.[9]

Economic barriers further limit access to essential medications and glucose monitoring devices. Many PwD in LMICs rely on out-of-pocket payments, making long-term diabetes management unaffordable.[10] Additionally, cultural factors play a critical role in healthcare-seeking behaviour.[11–13] In several Asian countries, many PwD turn to alternative and complementary medicine, which can contribute to poor glycaemic control or pose additional health risks.[14]

The rapid advancement of digital health technologies presents an opportunity to transform diabetes care across the region. The widespread adoption of smartphones, telemedicine platforms and mobile health (mHealth) applications offers new avenues for early detection, remote monitoring and patient education.[15,16] Innovations such as artificial intelligence (AI)-driven diagnostics, continuous glucose monitoring (CGM), and electronic health records (EHRs) have shown promise in improving clinical outcomes.[17–19] However, technological literacy gaps, regulatory hurdles and data security concerns hinder the widespread adoption of digital solutions.[20]

METHODOLOGY

Eight diabetes experts from seven countries (India, Japan, South Korea, the Philippines, Singapore, Australia, and Austria) were onboarded to identify key challenges and unmet needs for diabetes care in this region, exploring how technology and policies may be leveraged to bridge these gaps. These experts were selected based on their recognised expertise in diabetes care, clinical research and policy engagement in their respective countries. The panel included endocrinologists, nurse practitioners and diabetes educators affiliated with medical institutions and organisations with expertise in diabetes care, research, and policy development. The focus was (i) to highlight the barriers and unmet needs in diabetes care in Asia, (ii) to examine the evolving policy landscape, and (iii) to improve the standard of care through digital technology and policy changes within the continuum of diabetes care. Challenges in the current care pathways were identified and prioritised via email through a combination of literature reviews and expert consultations. Subsequently, experts provided independent input based on their national and regional experiences in clinical practice and healthcare delivery. This feedback was then consolidated to identify common themes and key barriers to effective healthcare delivery.

A focused review of published literature on PubMed and Google Scholar was undertaken to validate and supplement expert insights. Search terms included "diabetes management," "Asia," "digital health," "telemedicine," "healthcare access," and "real-world practice." Publications from 2010 to 2025, including regional guidelines, implementation studies, and digital health reports, were considered.

The process was exploratory and iterative, aimed at identifying and contextualising barriers, and discussing potential approaches to strengthen diabetes care in Asia. It was intended to generate expert perspectives and thematic insights.

The following sections discuss the key barriers to diabetes management in Asia, region-specific strategies in digital diabetes management, and future directions and policy recommendations by experts.

RESULTS

Key barriers to diabetes management in Asia

Despite growing awareness of the diabetes burden in Asia, effective management remains a significant challenge due to a range of systemic, socioeconomic and cultural factors. The region's diverse healthcare landscapes, particularly in LMICs, struggle with infrastructural limitations, financial constraints, and gaps in policy implementation. These barriers not only impede timely diagnosis and treatment but also undermine the continuity and quality of care for PwD. The following subsections explore the multifaceted challenges that hinder optimal diabetes management throughout the region.

Limited healthcare infrastructure and workforce shortages

One of the most pressing challenges in diabetes management is the shortage of trained healthcare professionals (HCPs) and the underdeveloped healthcare infrastructure in Asia.[3,21] Specialised diabetes care is often limited to urban centres, leading to limited access to timely diagnosis and treatment for those in rural areas.[5,12]

Fragmented care pathways

Healthcare delivery in Asia remains largely unstructured, particularly in LMICs.[3] The common practice of consulting multiple providers among PwD often results in uncoordinated management.[22] Furthermore, inadequately maintained patient registries and limited collaboration between primary and secondary care impair continuity of care, hindering effective disease management. Additionally, inefficient referral systems between primary care facilities and specialised diabetes centres contribute to delays in accessing advanced treatment.[3] Geographic factors further exacerbate these challenges in rural and resource-limited settings where access to care remains limited.[22]

Absence or poor implementation of national diabetes guidelines

Another challenge is the lack of or poor implementation of standardised national diabetes guidelines, leading to wide variations in treatment approaches.[3,23] HCPs may not consistently adhere to local guidelines due to

a lack of awareness or time constraints.[22] As a result, less than one-tenth of PwD in Asian LMICs receive diabetes treatment aligned with World Health Organisation (WHO) guidelines.[4]

Financial barriers and cost of care

Diabetes management places a significant financial burden on PwD in Asia, where public health insurance coverage is often inadequate.[8,22,24] High costs of medications and insulin contribute to poor disease control and an increased risk of complications.[5,25] Economic constraints also drive nonadherence to self-management practices. The financial impact of diabetes-related complications not only affects PwD but also places a growing burden on healthcare systems.[13]

Low awareness and lack of diabetes education

Lower levels of awareness about diabetes and its complications continue to be a major barrier to effective self-management practices among PwD.[12] Low health literacy, inadequate educational materials and insufficient patient counselling affect adherence to treatment among PwD.[22,26] Many PwDs lack a clear understanding of disease progression, the importance of glycaemic control and the long-term risks associated with uncontrolled diabetes. These challenges are exacerbated by overburdened healthcare systems, where limited appointment times and poor communication between health providers and PwD hinder the delivery of comprehensive diabetes education.[9,12,22] Furthermore, inconsistencies in healthcare provider training affect diabetes care quality across different healthcare clusters. In India, for instance, primary care HCPs often lack sufficient training in diabetes management.[5]

Poor screening rates for diabetes and complications

Diabetes screening in Asia is fraught with challenges, particularly in low-resource settings, where many cases go undetected in the early stages. The absence of clear global guidelines for screening in many countries contributes to low rates of early diagnosis. Commonly used screening tools, such as glycated haemoglobin (HbA1c) and oral glucose tolerance tests, may be unavailable to identify at-risk individuals.[12] Further, the uptake of diabetes screening among PwD may be limited by low awareness, reluctance to seek testing, apprehension about a potential diagnosis and the lifestyle adjustments it may require.[27]

Cultural barriers and preference for alternative medicine

Traditional diets and cultural factors can present additional challenges, as significant dietary modifications may be necessary for effective diabetes control.[12] The growing shift toward high-carbohydrate diets and increasingly sedentary lifestyles highlights the need for targeted interventions.[12,13] Compounding these challenges, many PwD opt for complementary and alternative medicine (CAM) alongside prescribed treatments. HCPs are often unaware of CAM use by patients, raising concerns about safety, potential drug interactions, and treatment efficacy.[14]

Limited adoption of digital tools

Digital health innovations have great potential to transform diabetes care, resulting in improved management and increased accessibility. However, their widespread adoption remains limited due to gaps in technological literacy, regulatory barriers and privacy concerns.[28,29] Many digital solutions fail to cater to the specific needs of PwD, particularly older adults, resulting in poor usability and engagement.[27] Without user-centric designs and more substantial policy support, these tools risk remaining underutilised, limiting their impact on improving diabetes management.

Region-specific strategies for addressing barriers in digital diabetes management

Asia is a highly diverse region, characterized by significant variations in economic development, health systems and the adoption of digital health technologies. Several countries have adopted distinct approaches to digital diabetes management, leveraging their unique healthcare landscapes and technological capacities. While Singapore has set a benchmark for AI-powered smart healthcare, India and Indonesia have leveraged telemedicine and national insurance integration to expand diabetes care. On the other hand, Japan has advanced AI-driven personalised medicine, tailoring treatments to individual patient needs.

Digital health solutions have revolutionised diabetes management, enabling remote care, AI-driven diagnostics, mobile health (mHealth) interventions, and centralised EHRs.[30,31,17] Several pioneering digital diabetes programmes have been implemented in Singapore, India, Japan, the Philippines, China, Malaysia, Indonesia, and Thailand. Examining these initiatives and successful international models from Europe, North America and Australia provides valuable insights into best practices and areas for improvement. A comparative analysis of these initiatives and successful international models from Germany, the United Kingdom (UK) and Canada offers valuable insights into best practices, scalability and future advancements in diabetes care.

Singapore: A global leader in smart health technologies

Singapore has emerged as a global benchmark for digital diabetes care, leading the way in healthcare solutions, centralised data systems and public-private collaborations. The country's strong digital infrastructure and government-backed initiatives have ensured high accessibility and efficiency in diabetes management.

The Singapore flagship initiative, the HealthHub platform, serves as a centralised digital health ecosystem, integrating EHRs, teleconsultations, AI-driven lifestyle coaching, and big data analytics. The key advantage of HealthHub is its ability to provide real-time access to patient data, enabling doctors, patients and caregivers to track glucose levels, medication adherence and lifestyle modifications seamlessly. Unlike traditional models that rely on fragmented

paper-based records, HealthHub ensures treatment continuity, particularly for patients with multiple healthcare providers.[32]

Singapore has also pioneered AI-based DR screening through the Singapore Eye Research Institute. This automated AI system detects diabetic eye complications with over 90% accuracy, significantly reducing screening time while increasing early detection rates and risk stratification. This programme overcomes the shortage of trained ophthalmologists in primary healthcare settings.[33]

A critical component of Singapore's success is the Smart Nation Healthcare Initiative, which utilizes big data analytics to predict diabetes trends, optimise resource allocation, and personalise intervention strategies.[32] This initiative helps prevent diabetes progression, thereby reducing long-term healthcare costs. Its studies on AI-based insulin dosing algorithms showed real-time glucose management, improving glycaemic control without the need for frequent doctor visits.[34]

Comparison with global models: Singapore's model is comparable to Denmark's National Health Data Network, which integrates EHRs across hospitals and primary care facilities, improving treatment coordination.[35,36]

Singapore's comprehensive digital infrastructure has addressed major barriers in diabetes management. By integrating AI-driven diagnostics, the country has significantly reduced its dependence on specialists, making diabetes screening more accessible to the general population. The introduction of centralised EHRs has ensured seamless data continuity, allowing physicians to track patient history efficiently and adjust treatment plans accordingly.

India: Expanding telemedicine and diabetes care

India has one of the largest diabetes populations globally, with disparities in care due to geographical barriers, limited specialist availability, and financial constraints. The country has leveraged telemedicine, AI-powered diagnostics, and mobile-based health interventions to expand diabetes care.

The e-Sanjeevani Telemedicine Platform,[37] launched by the Ministry of Health, provides virtual consultations, connecting PwD in remote areas with diabetes specialists, general practitioners, and nutritionists. This overcomes the shortage of endocrinologists, particularly in rural states where specialised care is scarce. The mDiabetes Programme, a WHO-Indian Council of Medical Research initiative, delivers short message service (SMS)-based diabetes education in multiple regional languages, ensuring accessibility for low-literacy populations. This programme has been instrumental in improving awareness, medication adherence, and self-care behaviours.[38] The Ayushman Bharat Digital Mission integrates EHRs across hospitals and clinics, ensuring seamless patient data access and improving treatment continuity and follow-ups.[39] This model is more extensive due to its multi-language mobile diabetes interventions, making them more inclusive for diverse populations.

In parallel, technology-driven innovations, such as tele-ophthalmology networks and AI-enabled smartphone-based retinal screening, have proven effective in detecting advanced DR. A multicentre study across 35 diabetes care centres demonstrated that tele-ophthalmology using Fundus on Phone devices enabled centralised grading by retina specialists and effectively identified sight-threatening DR (STDR), with 7.3% of screened individuals requiring referral.[40] Similarly, AI-assisted analysis of smartphone fundus images has shown very high sensitivity and specificity for detecting DR and STDR, providing a scalable solution for mass retinal screening.[41]

Comparison with global models: India's telemedicine model is similar to Canada's Ontario Telemedicine Network, which has successfully expanded access to specialists in remote regions. However, India's model is more extensive due to its multi-language mobile diabetes interventions, making them more inclusive for diverse populations.

India's digital interventions have addressed several systemic barriers in diabetes care. Telemedicine networks have expanded access to specialised diabetes care in rural areas, reducing healthcare inequities. AI-powered diagnostics have enhanced early detection of complications, preventing avoidable blindness and amputations. Mobile-based education programmes have also empowered patients with better self-management skills, improving long-term health outcomes.

Japan: Personalised diabetes management

Japan has focused extensively on AI-driven predictive analytics and patient-centred digital therapeutics to improve diabetes care. The Diabetes Digital Registry System, developed by the Japan Diabetes Society, allows real-time tracking of patient data across hospitals, ensuring timely intervention and coordinated care.[42]

A key innovation is Fujitsu's Healthy Living, a cloud-based data platform,[43] that aggregates and standardises patient health information. It aims to support AI-enabled personalised healthcare by analysing real-time patient data to inform clinical decision-making and individual care.

Japan has also pioneered AI-integrated insulin pumps integrated with CGM, allowing automated insulin dose adjustments based on real-time glucose readings.[44] Japan's real-time AI-powered insulin adjustments make it one of the most advanced diabetes management systems globally.

Comparison with global models: Japan's AI-driven predictive healthcare is similar to the UK's National Diabetes Prevention Programme, which also integrates behavioural AI coaching.[45]

Japan's AI-driven healthcare solutions have transformed diabetes management by making treatment highly personalised and data-driven. The nationwide digital diabetes registry ensures continuous patient monitoring, while machine learning-based predictive analytics help doctors optimise medication dosages and provide lifestyle recommendations.

The Philippines: Expanding telemedicine and remote monitoring

In the Philippines, access to diabetes care is uneven, particularly in rural areas where healthcare infrastructure remains limited. The Philippines' eHealth Strategic Framework was introduced to expand digital health platforms and integrate diabetes management into the national health system. The Diabetes Telemedicine Programme, a government initiative led by the Department of Health, has played a crucial role in linking PwD with endocrinologists and general practitioners through teleconsultations.[46]

In addition to government-led programmes, private-sector initiatives offering home-based consultations, such as the AIDE Mobile App,[47] have enhanced diabetes care. They also provide diagnostic services and medication delivery, reducing the need for hospital visits and ensuring continuity of care for patients with limited mobility or transportation constraints.

Comparison with global models: The Philippines' telehealth model, similar to Canada's Ontario Telemedicine Network,[48] focuses on mHealth solutions, making diabetes care more accessible to low-income populations.

The Philippines has tackled healthcare accessibility challenges by leveraging telemedicine and mHealth solutions to connect rural communities with specialised care.

China: Diabetes diagnostics and smart wearables

China has taken a data-driven approach to diabetes care, integrating big data analytics and smart wearable technology to enhance early diagnosis, prevention and long-term management.[49]

Additionally, AI-powered glucose monitoring devices are widely used for continuous diabetes tracking, providing real-time alerts for abnormal blood sugar levels.[50] This has been particularly effective in preventing severe diabetes-related complications in the elderly and high-risk populations.

Comparison with global models: China's big data-driven diabetes care is comparable to the UK's National Diabetes Prevention Programme, which also employs risk assessment models to identify high-risk individuals and intervene early.[45]

China's big data integration and AI-driven monitoring systems have addressed the challenge of fragmented patient data and inconsistent diabetes management protocols. By leveraging nationwide digital registries, China has ensured that PwD receive evidence-based treatment tailored to their specific needs.[51] The government's partnerships with private AI companies have also accelerated technological innovation, making diabetes care more efficient.

Malaysia: Digital health integration into primary care

Malaysia has made significant strides in incorporating digital health solutions into its primary healthcare system to improve diabetes management. The MyDiabetes App, developed by the Ministry of Health Malaysia, provides an AI-driven self-management platform that enables PwD to track blood sugar levels, monitor diet, receive personalised treatment recommendations, and access educational resources. Unlike traditional diabetes management approaches, this app enables real-time intervention and remote monitoring, promoting better adherence to treatment plans.[52]

Government initiatives, such as the Diabetes Medication Therapy Adherence Clinics in Malaysian hospitals, integrate pharmacists into diabetes care teams to provide structured education on medication use, lifestyle modifications, and self-monitoring techniques.[53]

The National eHealth Strategy (2019–2025) focuses on integrating EHRs across healthcare facilities to create a unified patient data system, making treatment history accessible across different healthcare settings. This initiative reduces the risk of fragmented care and medication errors, ensuring PwD receive consistent and well-informed medical support.[54]

Comparison with global models: Malaysia's mHealth strategies are similar to Germany's regional diabetes care programmes. However, Malaysia's mobile clinics extend healthcare access to underserved regions, ensuring proactive intervention rather than reactive treatment.

Malaysia's digital health integration addresses major barriers such as limited access to specialists, a lack of structured diabetes education, and poor follow-up care. Through government-backed initiatives and mHealth interventions, the country has made diabetes management more inclusive and patient-centred. By integrating EHRs into primary care, Malaysia ensures continuity of care.

Indonesia: National insurance and digital diabetes solutions

Indonesia has taken a national policy-driven approach to digital diabetes care, integrating telemedicine and digital monitoring into its universal health insurance system. The Kesehatan Digital Health Framework, launched by the Indonesian National Health Insurance Agency, allows PwD to access subsidised CGM devices, participate in remote consultations, and receive AI-driven medication adjustments through a government-backed mobile application.[55]

Comparison with global models: Indonesia's community-driven diabetes programmes resemble Canada's remote diabetes management initiatives. However, Indonesia's large-scale integration into a national insurance model minimises financial constraints, making the approach more inclusive and sustainable.

By integrating digital diabetes monitoring into its national insurance framework, Indonesia has significantly reduced financial barriers to advanced diabetes care. The use of AI-powered predictive models has allowed for earlier detection of diabetes, reducing long-term complications. The training of village health workers in mobile diabetes monitoring has ensured that care reaches rural populations, eliminating the geographical barriers traditionally associated with specialist-led diabetes treatment.

Thailand: Nationwide digital diabetes monitoring

AI-based hospital screening programs have been deployed in Thailand's major public hospitals, where AI-assisted DR screening tools have reduced waiting times and increased early detection rates. These programs are particularly impactful in rural areas, where specialist ophthalmologists are limited.[56] Additionally, Thailand's Ministry of Public Health has launched an innovative telemedicine service known as the 'Health Station' to improve healthcare access and reduce hospital congestion.[57]

Comparison with global models: Thailand's national diabetes monitoring system is comparable to Germany's digital model, which promotes AI-assisted monitoring tools (e.g., Esysta) that support diabetes self-management.[58]

Thailand's comprehensive digital diabetes strategy has tackled barriers such as fragmented care, specialist shortages and a lack of structured patient monitoring. The country ensures timely intervention and long-term disease control by integrating national registries with AI-based monitoring. Implementing hospital-based AI screenings has significantly reduced undiagnosed diabetic complications, ensuring earlier, targeted and more effective interventions.

South Korea: Telemedicine and online glycaemic monitoring platforms

The Korean Diabetes Association supports the integration of telemedicine, enabling remote consultations.[59] It also fosters collaborations for exploring AI-driven treatment protocols and innovative management strategies. Seoul National University Bundang Hospital spearheads government-funded initiatives for research networks and advancing AI-driven healthcare software.[60] Korea-exclusive platforms (e.g., Diaconn Web) provide free online glycaemic monitoring solutions, allowing users to seamlessly integrate CGMs, glucose meters, and insulin pumps (automated insulin delivery and continuous subcutaneous insulin infusion therapy) with diabetes therapy for more effective disease management.[61]

Comparison with global models: Korea's telemedicine concept is comparable to Australia's, where telemedicine plays a significant role in diabetes management, particularly in remote areas. Initiatives such as Diabetes Western Australia's telehealth clinics offer free, personalised consultations with certified diabetes educators.[62]

The various strategies illustrated from different countries and continents emphasise that technology-driven interventions can bridge gaps in diabetes management, offering scalable models for other regions facing similar challenges. However, continued investment, policy support, and regional collaborations will ensure the long-term success and expansion of digital diabetes care across Asia.

DISCUSSION

Future directions and policy recommendations

The future of diabetes care in Asia hinges on the successful integration of digital health solutions, policy reforms and enhanced healthcare infrastructure. As diabetes prevalence rises, governments, healthcare institutions and private-sector stakeholders must collaborate to implement sustainable, patient-centric solutions. Several key areas must be prioritised to ensure equitable and effective diabetes management across the region.

Strengthening national diabetes policies and guidelines

One of the foremost challenges in diabetes management is the lack of standardised national guidelines across many Asian countries.[23] Policymakers must focus on developing and implementing region-specific diabetes management frameworks that consider local healthcare capacities, socioeconomic factors and cultural behaviours.[23] Strengthening national diabetes action plans with clear targets for screening, treatment adherence and complication prevention is essential to reducing the disease burden.[23,63]

Expanding public and private health insurance coverage

Affordability remains a critical issue in diabetes care, particularly in LMICs where many PwD are unable to afford long-term treatment.[13,22] Governments should consider expanding public health insurance schemes to cover essential diabetes medications, CGMs and telemedicine consultations.[64,65] Innovative financing models, including microinsurance for diabetes,[66] and public-private partnerships, can play a pivotal role in reducing the financial burden on patients.[67] Expanding public health insurance programmes, subsidising diabetes medications, and introducing value-based pricing models can help reduce economic barriers and improve treatment adherence.[65,68,69]

Advancing digital health and telemedicine adoption

While digital health solutions have demonstrated efficacy in improving diabetes management, widespread adoption remains a challenge due to regulatory fragmentation and

a lack of integration into existing healthcare systems.[20,30] Policymakers must establish clear regulatory frameworks to standardise telemedicine practices, ensure data security and promote interoperability between digital health tools and EHRs.[19] Governments can also invest in digital literacy programmes to train HCPs and PwD on the effective use of mHealth applications, wearable devices, and AI-powered diagnostics.[70,71] Community health workers (CHWs) can be incentivised to adopt digital diabetes tools for routine diabetes screenings in underserved areas.[72]

Leveraging artificial intelligence for personalised care

AI-driven solutions have the potential to revolutionise diabetes management by enabling early detection, predictive analytics and personalised treatment regimens.[30] Machine-learning algorithms can analyse real-time patient data to provide tailored recommendations for glycaemic control, dietary habits and medication adjustments.[17,34] AI-assisted DR screening programmes have already shown promise in countries like Singapore and India, reducing the burden on ophthalmologists and improving early intervention rates.[33,71] Studies from India have demonstrated that AI-based assessment using smartphone fundus photography has high sensitivity for detecting severe DR.

Strengthening healthcare workforce and task-shifting strategies

Addressing the shortage of diabetes specialists in Asia requires a shift towards task-sharing models where trained nurses, pharmacists, and CHWs take on expanded roles in diabetes education and screening.[73,74] Community-based diabetes programmes that empower non-physician healthcare providers have been effective in countries like India and the Philippines.[75,76] Digital tools, such as mobile-based decision-support systems, can further enhance the capabilities of frontline health workers in managing diabetes.[74] Task-shifting strategies, such as training nurses, pharmacists, and CHWs, can expand service delivery, while telemedicine can facilitate remote consultations for underserved regions.[73,77,78]

Establishing regional collaborations and knowledge-sharing platforms

Regional cooperation between nations can facilitate knowledge exchange, policy harmonisation and the scaling of successful diabetes interventions. Organisations such as the Asian Diabetes Prevention Initiative and the IDF work towards creating shared platforms for research collaboration, best practice dissemination, and joint public health initiatives.[79] Establishing localised diabetes guidelines and continuous training programmes for healthcare providers can ensure standardised care delivery.[80]

Investing in research and development for innovative therapies

In addition to digital health solutions, continued investment in research and development is crucial for advancing novel diabetes therapies, including precision medicine approaches.[4,81] Governments and private-sector partners should increase funding for diabetes research for Asian populations. Table 1 summarises the key barriers and potential solutions to addressing them.

Table 1. Challenges and facilitators in diabetes management

Challenges / Barriers	Facilitators / Enablers
Limited healthcare infrastructure and workforce shortages	• Train nurses, pharmacists, and CHWs to manage diabetes. • Expand telemedicine services for remote access.
Fragmented care pathways	• Establish EHRs and diabetes registries for seamless care coordination.
Absence or poor implementation of national diabetes guidelines	• Develop region-specific guidelines and ensure effective implementation. • Conduct training programmes for healthcare providers.
Financial barriers and cost of care	• Expand public health insurance and subsidise medication programmes. • Introduce value-based pricing models for diabetes care.
Low awareness and a lack of diabetes education	• Implement community-based diabetes education and mobile screening units. • Integrate blood glucose testing into routine health checkups.
Cultural barriers and preference for alternative medicine	• Regulate alternative treatments while integrating culturally adapted diabetes interventions. • Integrating discussions about CAM use into routine consultations could improve patient-provider communication and ensure safer, more effective diabetes management.
Limited adoption of digital health tools	• Enhance digital literacy and train healthcare workers on diabetes technology. • Strengthen data security for digital solutions.
High cost of advanced diabetes tools (CGMs, AI-driven screening, etc.)	• Provide subsidies and government incentives for digital diabetes tools. • Promote public-private partnerships for broader access.

AI: Artificial intelligence; CAM: Complementary and alternative medicine; CGM: Continuous glucose monitoring; CHW: Community health worker; EHR: Electronic health record.

CONCLUSION

A comprehensive, multi-sectoral approach integrating policy reforms, financial mechanisms, digital innovations and community-based strategies is essential to tackle the growing diabetes crisis in Asia. By leveraging emerging technologies, improving healthcare accessibility, and fostering regional collaborations, Asia-Pacific countries can build resilient and inclusive diabetes care ecosystems. Continued investment in healthcare infrastructure, digital transformation and workforce development will be critical in ensuring long-term, sustainable improvements in diabetes management across the region.

Acknowledgements

Medical writing and editorial assistance were provided by BioQuest Solutions Pvt. Ltd, funded by Becton Dickinson.

Statement of Authorship

All authors fulfilled ICMJE authorship criteria.

CRediT Author Statement

DSLG, JKM, SK: Conceptualization, Writing – original draft preparation, Writing – review and editing; **IK, BS, KS, SB**: Writing – review and editing; **MLV:** Writing – review and editing, Funding acquisition.

Data Availability

No datasets were generated or analysed for this study.

Author Disclosure

DSLG received speaker fees and honorariums from Roche, Sanofi, BD/Embecta, Abbott Diabetes Care, Medtronic, and Novo Nordisk. Received advisory fees from BD/Embecta, DKSH, and Novo Nordisk. **JKM** is a member of the advisory boards of Abbott Diabetes Care, Becton-Dickinson/Embecta, Dexcom, Biomea, Eli Lilly, Medtronic, MyLife, Novo Nordisk, Pharmasens, Roche Diabetes Care, Sanofi, Tandem, Viatris, received speaker honoraria from Abbott Diabetes Care, A. Menarini Diagnostics, Becton-Dickinson/Embecta, Dexcom, Eli Lilly, MedTrust, Novo Nordisk, Roche Diabetes Care, Sanofi, Ypsomed and is a shareholder of decide Clinical Software GmbH, elyte Diagnostics. **SK** received speaker fees from Boehringer Ingelheim, Novo Nordisk, and Sanofi. **MLV** received speaker fees and an honorarium from Bayer. **SB** is an employee and stockholder of BD/Embecta (formerly BD Diabetes Care), a manufacturer of a range of insulin delivery devices. No other potential conflict of interest relevant to this article was reported by the rest of the authors.

Funding Source

Medical writing and editorial support were funded by Becton Dickinson/Embecta (formerly BD Diabetes Care), Singapore, a manufacturer of a range of insulin delivery devices, in accordance with GPP 2022 guidelines (https://www.ismpp.org/gpp-2022).

References

1. Shi W, Wang Q, Zhang J, Zhang J, Tan F, Yu S. Incidence tendency analysis on type 2 diabetes in 4 Asian countries - China, Malaysia, Singapore, and Thailand, 1990–2019. China CDC Wkly. 2021;3(52):1113–7. PMID: 35186367 PMCID: PMC8855074 DOI: 10.46234/ccdcw2021.268
2. International Diabetes Federation. IDF Diabetes Atlas. Accessed April 21, 2025. https://diabetesatlas.org/data-by-location/global/.
3. Tham TY, Tran TL, Prueksaritanond S, Isidro JS, Setia S, Welluppillai V. Integrated health care systems in Asia: An urgent necessity. Clin Interv Aging. 2018;13:2527–38. PMID: 30587945 PMCID: PMC6298881 DOI: 10.2147/CIA.S185048
4. Flood D, Seiglie JA, Dunn M, et al. The state of diabetes treatment coverage in 55 low-income and middle-income countries: A cross-sectional study of nationally representative, individual-level data in 680 102 adults. Lancet Healthy Longev. 2021;2(6):e340–51. PMID: 35211689 PMCID: PMC8865379 DOI: 10.1016/s2666-7568(21)00089-1
5. Das AK, Saboo B, Maheshwari A, et al. Health care delivery model in India with relevance to diabetes care. Heliyon. 2022;8(10):e10904. PMID: 36237970 PMCID: PMC9552106 DOI: 10.1016/j.heliyon.2022.e10904
6. Hossain MJ, Al-Mamun M, Islam MR. Diabetes mellitus, the fastest growing global public health concern: Early detection should be focused. Health Sci Rep. 2024;7(3):e2004. PMID: 38524769 PMCID: PMC10958528 DOI: 10.1002/hsr2.2004
7. Fottrell E, Ahmed N, Shaha SK, et al. Diabetes knowledge and care practices among adults in rural Bangladesh: A cross-sectional survey. BMJ Glob Health. 2018;3(4):e000891. PMID: 30057800 PMCID: PMC6058170 DOI: 10.1136/bmjgh-2018-000891
8. Pati S, Swain S, van den Akker M, Schellevis FG, Pati S, Burgers JS. Health care utilization and out-of-pocket expenditure of type 2 diabetic patients: A study in primary care in Bhubaneswar, India. J Family Med Prim Care. 2022;11(11):6714–25. PMID: 36993016 PMCID: PMC10041221 DOI: 10.4103/jfmpc.jfmpc_1305_21
9. Shivashankar R, Kirk K, Kim WC, et al. Quality of diabetes care in low- and middle-income Asian and Middle Eastern countries (1993-2012): 20-year systematic review. Diabetes Res Clin Pract. 2015;107(2):203–23. PMID: 25529849 DOI: 10.1016/j.diabres.2014.11.004
10. Singh K, Narayan KMV, Eggleston K. Economic impact of diabetes in South Asia: The magnitude of the problem. Curr Diab Rep. 2019;19(6):34. PMID: 31098775 DOI: 10.1007/s11892-019-1146-1
11. Adhikari B, Mishra SR. Culture and epidemiology of diabetes in South Asia. J Glob Health. 2019;9(2):020301. PMID: 31448112 PMCID: PMC6684867 DOI: 10.7189/jogh.09.020301
12. Karachaliou F, Simatos G, Simatou A. The challenges in the development of diabetes prevention and care models in low-income settings. Front Endocrinol (Lausanne). 2020;11:518. PMID: 32903709 PMCID: PMC7438784 DOI: 10.3389/fendo.2020.00518
13. Ide N, LoGerfo JP, Karmacharya B. Barriers and facilitators of diabetes services in Nepal: A qualitative evaluation. Health Policy Plan. 2018;33(4):474–82. PMID: 29447397 DOI: 10.1093/heapol/czy011
14. Kesavadev J, Saboo B, Sadikot S, et al. Unproven therapies for diabetes and their implications. Adv Ther. 2017;34(1):60–77. PMID: 27864668 PMCID: PMC5216071 DOI: 10.1007/s12325-016-0439-x
15. Correia JC, Meraj H, Teoh SH, et al. Telemedicine to deliver diabetes care in low- and middle-income countries: A systematic review and meta-analysis. Bull World Health Organ. 2021;99(3):209–19B. PMID: 33716343 PMCID: PMC7941107 DOI: 10.2471/BLT.19.250068
16. Munshi KD, Amelung K, Carter CS, James R, Shah BR, Henderson RR. Impact of a diabetes remote monitoring program on medication adherence. J Manag Care Spec Pharm. 2021;27(6):724–31. PMID: 34057390 PMCID: PMC10391223 DOI: 10.18553/jmcp.2021.27.6.724
17. Li J, Huang J, Zheng L, Li X. Application of artificial intelligence in diabetes education and management: Present status and promising prospect. Front Public Health. 2020;8:173. PMID: 32548087 PMCID: PMC7273319 DOI: 10.3389/fpubh.2020.00173
18. Yang SJ, Lim SY, Choi YH, Lee JH, Yoon KH. Effects of an electronic medical records-linked diabetes self-management system on treatment targets in real clinical practice: Retrospective, observational cohort study. Endocrinol Metab (Seoul). 2024;39(3):537. PMID: 38509668 PMCID: PMC11066442 DOI: 10.3803/EnM.2023.1878
19. Kerr D, Klonoff DC, Bergenstal RM, Choudhary P, Ji L. A Roadmap to an Equitable Digital Diabetes Ecosystem. Endocr Pract. 2023;29(3):179–84. PMID: 36584818 DOI: 10.1016/j.eprac.2022.12.016
20. Mackenzie SC, Sainsbury CAR, Wake DJ. Diabetes and artificial intelligence beyond the closed loop: a review of the landscape, promise and challenges. Diabetologia. 2024;67(2):223–35. PMID: 37979006 PMCID: PMC10789841 DOI: 10.1007/s00125-023-06038-8
21. Widyahening I, Kayode G, Wangge G, Grobbee D. Country Characteristics and variation in diabetes prevalence among Asian Countries - an ecological study. J ASEAN Fed Endocr Soc. 2019;34(1):80–6. PMID: 33442140 PMCID: PMC7784088 DOI: 10.15605/jafes.034.01.12
22. Lall D, Engel N, Devadasan N, Horstman K, Criel B. Models of care for chronic conditions in low/middle-income countries: A 'best fit' framework synthesis. BMJ Glob Health. 2018;3(6):e001077. PMID: 30687524 PMCID: PMC6326308 DOI: 10.1136/bmjgh-2018-001077
23. Owolabi MO, Yaria JO, Daivadanam M, et al. Gaps in guidelines for the management of diabetes in low- and middle-income versus high-income Countries - a systematic review. Diabetes Care. 2018;41(5):1097–05. PMID: 30899566 PMCID: PMC6407562 DOI: 10.1136/bmjgh-2018-001258
24. Moucheraud C, Lenz C, Latkovic M, Wirtz VJ. The costs of diabetes treatment in low- and middle-income countries: A systematic review. BMJ Glob Health. 2019;4(1):e001258. PMID: 30899566 PMCID: PMC6407562 DOI: 10.1136/bmjgh-2018-001258
25. Sharma A, Kaplan WA, Satheesh G, et al. Health system capacity and access barriers to diagnosis and treatment of CVD and diabetes in Nepal. Glob Heart. 2021;16(1):38. PMID: 34040951 PMCID: PMC8139299 DOI: 10.5334/gh.927
26. Puri IY, Yusof BM, Zaid ZA, Ismail A, Haron H, Lipoeto NI. The individual nutrition education needs among patients with type 2 diabetes at the public health centers in Padang, Indonesia: A cross-sectional study. Nutrients. 2022;14(5):1105. PMID: 35268080 PMCID: PMC8912844 DOI: 10.3390/nu14051105
27. AshaRani PV, Devi F, Wang P, et al. Factors influencing uptake of diabetes health screening: A mixed methods study in Asian population. BMC Public Health. 2022;22(1):1511. PMID: 35941579 PMCID: PMC9360713 DOI: 10.1186/s12889-022-13914-2
28. Fleming GA, Petrie JR, Bergenstal RM, Holl RW, Peters AL, Heinemann L. Diabetes digital app technology: benefits, challenges, and recommendations. A consensus report by the European Association for the Study of Diabetes (EASD) and the American Diabetes Association (ADA) Diabetes Technology Working Group. Diabetologia. 2020;63(2):229–41. PMID: 31802144 DOI: 10.1007/s00125-019-05034-1
29. Jain SR, Sui Y, Ng CH, Chen ZX, Goh LH, Shorey S. Patients' and healthcare professionals' perspectives towards technology-assisted diabetes self-management education. A qualitative systematic review. PLoS One. 2020;15(8):e0237647. PMID: 32804989 PMCID: PMC7430746 DOI: 10.1371/journal.pone.0237647
30. Klonoff AN, Andy Lee WA, Xu NY, Nguyen KT, DuBord A, Kerr D. Six digital health technologies that will transform diabetes. J Diabetes Sci Technol. 2023;17(1):239–49. PMID: 34558330 PMCID: PMC9846384 DOI: 10.1177/19322968211043498

31. Greenwood DA, Gee PM, Fatkin KJ, Peeples M. A systematic review of reviews evaluating technology-enabled diabetes self-management education and support. J Diabetes Sci Technol. 2017;11(5): 1015–27. PMID: 28560898 PMCID: PMC5951000 DOI: 10.1177/1932296817713506
32. Smart Nation and Digital Government Office. A thriving digital future for all. Accessed April 22, 2025. https://www.smartnation.gov.sg/
33. Xu X, Zhang M, Huang S, Li X, Kui X, Liu J. The application of artificial intelligence in diabetic retinopathy: progress and prospects. Front Cell Dev Biol. 2024;12:1473176. PMID: 39524224 PMCID: PMC11543434 DOI: 10.3389/fcell.2024.1473176
34. Sun X, Bee YM, Lam SW, et al. Effective treatment recommendations for type 2 diabetes management using reinforcement learning: treatment recommendation model development and validation. J Med Internet Res. 2021;23(7):e27858. PMID: 34292166 PMCID: PMC8367185 DOI: 10.2196/27858
35. Danish Health Data Authority. Digital health solutions. Accessed April 23, 2025. https://english.sundhedsdatastyrelsen.dk/digital-health-solutions
36. Danish Health Data Authority. Better health through the use of data and digital coherence. Accessed April 25, 2025. https://english.sundhedsdatastyrelsen.dk/
37. Government of India. eSanjeevani - National Telemedicine Service. Accessed April 26, 2025. https://services.india.gov.in/service/detail/esanjeevani-national-telemedicine-service
38. Rani PK, Williams JD, Jaswal N, et al. Effectiveness of mDiabetes intervention in enhancing diabetes awareness and promoting healthy lifestyle changes among the general population in rural India. Front Public Health. 2025;12:1470615. PMID: 39944562 PMCID: PMC11818752 DOI: 10.3389/fpubh.2024.1470615
39. Mishra US, Yadav S, Joe W. The Ayushman Bharat Digital Mission of India: An Assessment. Health Syst Reform. 2024;10(2):2392290. PMID: 39437234 DOI: 10.1080/23288604.2024.2392290
40. Rajalakshmi R, UmaSankari G, Prathiba V, et al. Tele-ophthalmology versus face-to-face retinal consultation for assessment of diabetic retinopathy in diabetes care centers in India: A multicenter cross-sectional study. Diabetes Technol Ther. 2022;24(8):556–63. PMID: 35294275 PMCID: PMC9353985 DOI: 10.1089/dia.2022.0025
41. Rajalakshmi R, Subashini R, Anjana RM, et al. Automated diabetic retinopathy detection in smartphone-based fundus photography using artificial intelligence. Eye (Lond). 2018;32(6):1138–44. PMID: 29520050 PMCID: PMC5997766 DOI: 10.1038/s41433-018-0064-9
42. Sugiyama T, Miyo K, Tsujimoto T, et al. Design of and rationale for the Japan Diabetes compREhensive database project based on an advanced electronic medical record system (J-DREAMS). Diabetol Int. 2017;8(4):375–82. PMID: 30603343 PMCID: PMC6224921 DOI: 10.1007/s13340-017-0326-y
43. Fujitsu Limited. Fujitsu launches new cloud-based platform for healthcare sector in Japan, promoting personalized healthcare and drug development. Accessed April 27, 2025. https://www.fujitsu.com/global/about/resources/news/press-releases/2023/0328-01.html
44. Medtronic Diabetes. Innovation milestones. Published 2012. Accessed April 28, 2025. https://www.medtronicdiabetes.com/about-medtronic-innovation/milestone-timeline
45. NHS England. NHS Diabetes Prevention Programme (NHS DPP). Accessed April 25, 2025. https://www.england.nhs.uk/diabetes/diabetes-prevention/
46. Evio BD, Bonito SR. Formative evaluation of the implementation of eHealth in the Philippines: A qualitative study. Acta Med Philipp. 2024;58(12):35–47. PMID: 39071527 PMCID: PMC11272894 DOI: 10.47895/amp.v58i12.9289
47. AIDE. Home: Our Services. Accessed April 28, 2025. https://www.aide-app.com
48. AIDE. E-Consultation. Accessed April 28, 2025. https://www.aide-app.com/e-consultation
49. He Z, Li W. AI-Driven management of type 2 diabetes in China: opportunities and challenges. Diabetes Metab Syndr Obes. 2025;18: 85–92. PMID: 39802619 PMCID: PMC11718508 DOI: 10.2147/DMSO.S495364
50. HUAWEI Community. Huawei confirms blood sugar (hyperglycemia) feature for Watch 4 series. Accessed April 22, 2025. https://consumer.huawei.com/za/community/details/topicId-265233/
51. China Diabetes Registry - a prospective cohort study of patients with diabetes in national metabolic management centers in China. ClinicalTrials.gov. Accessed April 29, 2025. https://clinicaltrials.gov/ct2/show/NCT03113276
52. Jamhari MN, Ammar M, Zamzuri I, et al. My diabetes apps: Improving knowledge, compliance, and control in uncontrolled type 2 diabetes patients in Kedah, Malaysia. Global J Public Health Med. 2024;6(2):1107–22. DOI: 10.37557/gjphm.v6i2.272
53. Hussein Z, Taher SW, Gilcharan Singh HK, Chee Siew Swee W. Diabetes care in Malaysia: Problems, new models, and solutions. Ann Glob Health. 2015;81(6):851–62. PMID: 27108152 DOI: 10.1016/j.aogh.2015.12.016
54. Dewadas H, James Michael JA, Nadarajan R, Adrus N, Abdul Shukor SF, Ka Fei L. Digitalisation in healthcare: A review of present developments in Malaysia. In Proceedings of the 11th International Conference on Business, Accounting, Finance and Economics (BAFE 2023). Atlantis Press; 2023:77–92. DOI: 10.2991/978-94-6463-342-9_7.
55. Blueprint for digital health transformation strategy 2024 for Indonesia. digital watch observatory. Accessed April 28, 2025. https://dig.watch/resource/blueprint-for-digital-health-transformation-strategy-2024-for-indonesia
56. Ruamviboonsuk P, Tiwari R, Sayres R, et al. Real-time diabetic retinopathy screening by deep learning in a multisite national screening programme: a prospective interventional cohort study. Lancet Digit Health. 2022;4(4):e235–44. PMID: 35272972 DOI: 10.1016/S2589-7500(22)00017-6
57. Dharmaraj S. Thailand's telemedicine solution to improve healthcare access. OpenGov Asia. Accessed April 26, 2025.https://archive.opengovasia.com/2024/12/11/thailands-telemedicine-solution-to-improve-healthcare-access/?c=ph
58. Schliess F, Affini Dicenzo T, Gaus N, et al. The German fast track toward reimbursement of digital health applications: Opportunities and challenges for manufacturers, healthcare providers, and people with diabetes. J Diabetes Sci Technol. 2024;18(2):470–6. PMID: 36059268 PMCID: PMC10973846 DOI: 10.1177/19322968221121660
59. International Diabetes Federation. Korean Diabetes Association. Accessed April 24, 2025. https://idf.org/our-network/regions-and-members/western-pacific/members/republic-of-korea/korean-diabetes-association/
60. Seoul National University Bundang Hospital. Accessed April 23, 2025. https://www.snubh.org/dh/en/
61. Yoo JH, Kim JH. Advances in continuous glucose monitoring and integrated devices for management of diabetes with insulin-based therapy: improvement in glycemic control. Diabetes Metab J. 2023;47(1):27–41. PMID: 36635028 PMCID: PMC9925143 DOI: 10.4093/dmj.2022.0271
62. Diabetes WA clinic. Australian Diabetes Educators Association. Accessed April 25, 2025. https://www.adea.com.au/clinics/diabetes-wa-clinic/
63. Chawla R, Madhu SV, Makkar BM, et al. RSSDI-ESI clinical practice recommendations for the management of type 2 diabetes mellitus 2020. Indian J Endocrinol Metab. 2020;24(4):1–122. PMID: 32699774 PMCID: PMC7328526 DOI: 10.4103/ijem.IJEM_225_20
64. Hills AP, Misra A, Gill JMR, et al. Public health and health systems: implications for the prevention and management of type 2 diabetes in south Asia. Lancet Diabetes Endocrinol. 2018;6(12):992–1002. PMID: 30287104 DOI: 10.1016/S2213-8587(18)30203-1
65. Pearce F, Lin L, Teo E, Ng K, Khoo D. Health technology assessment and its use in drug policies: Singapore. Value Health Reg Issues. 2019;18:176–83. PMID: 29954696 DOI: 10.1016/j.vhri.2018.03.007
66. Morgan L. Microinsurance: A new insurance model for the developing world. Milliman. Published September 28, 2010. Accessed April 26, 2025. https://www.milliman.com/en/insight/health/Microinsurance-A-new-insurance-model-for-the-developing-world
67. Williams A, Ford A, Webb M, Knight M, Costa K, Hinton C. Public-private partnerships to lower the risk of diabetes among black women using cooperative agreements: the national diabetes prevention program and the black women's health imperative. J Womens Health (Larchmt). 2022;31(8):1079–83. PMID: 35834621 PMCID: PMC9488192 DOI: 10.1089/jwh.2022.0259
68. Dhillon I, Jhalani M, Thamarangsi T, Siyam A, Singh PK. Advancing universal health coverage in the WHO South-East Asia Region with a focus on human resources for health. Lancet Reg Health Southeast Asia. 2023;18:100313. PMID: 38028168 PMCID: PMC10667288 DOI: 10.1016/j.lansea.2023.100313
69. James N, Acharya Y. Increasing health insurance enrollment in low- and middle-income countries: what works, what does not, and research gaps: A scoping review. inquiry. 2022;59:469580221090396. PMID: 35574923 PMCID: PMC9121503 DOI: 10.1177/00469580221090396
70. van den Broucke S, Vandenbosch J. Improving the digital health literacy of diabetic patients. Eur J Public Health. 2018;28(suppl_4): cky213.069. https://app.amanote.com/v4.5.15/research/note-taking?resourceId=36P84nMBKQvf0BhiCJQz
71. Kesavadev J, Krishnan G, Mohan V. Digital health and diabetes: experience from India. Ther Adv Endocrinol Metab. 2021;12: 20420188211054676. PMID: 34820114 PMCID: PMC8606976 DOI: 10.1177/20420188211054676

72. Chariwala RA, Shukla R, Gajiwala UR, et al. Effectiveness of health education and monetary incentive on uptake of diabetic retinopathy screening at a community health center in South Gujarat, India. Indian J Ophthalmol. 2020;68(Suppl 1):S52-5. PMID: 31937730 PMCID: PMC7001183 DOI: 10.4103/ijo.IJO_2118_19
73. Paluyo J, Stake A, Bryson R. 'Padayon': A new digital health model for diabetes and hypertension in rural Philippines. BMJ Innovations. 2023;9(1). DOI: 10.1136/bmjinnov-2021-000900
74. Bassi A, Arfin S, John O, et al. Innovative mobile-health led participatory approach to comprehensive screening and treatment of diabetes (IMPACT diabetes): rationale, design, and baseline characteristics. Int J Diabetes Dev Ctries. 2023;43:353–62. DOI: 10.1007/s13410-022-01082-3
75. Mirhoseiny S, Geelvink T, Martin S, Vollmar HC, Stock S, Redaelli M. Does task delegation to non-physician health professionals improve quality of diabetes care? Results of a scoping review. PLoS One. 2019;14(10):e0223159. PMID: 31603900 PMCID: PMC6788697 DOI: 10.1371/journal.pone.0223159
76. Alaofè H, Asaolu I, Ehiri J, et al. Community health workers in diabetes prevention and management in developing countries. Ann Glob Health. 2017;83(3-4):661–75. PMID: 29221543 DOI: 10.1016/j.aogh.2017.10.009
77. IDF clinical practice recommendations for managing type 2 diabetes in primary care. International Diabetes Federation. Accessed April 27, 2025. https://idf.org/media/uploads/2023/05/attachments-63.pdf
78. Vadheim LM, Patch K, Brokaw SM, et al. Telehealth delivery of the diabetes prevention program to rural communities. Transl Behav Med. 2017;7(2):286–91. PMID: 28417426 PMCID: PMC5526819 DOI: 10.1007/s13142-017-0496-y
79. Asian Diabetes Prevention Initiative. The Nutrition Source. Harvard T.H. Chan School of Public Health. Accessed April 21, 2025. https://nutritionsource.hsph.harvard.edu/asian-diabetes-prevention-initiative/
80. ACE Repository for Clinical Guidances (ACGs). Agency for care effectiveness. Accessed April 25, 2025. https://www.ace-hta.gov.sg/healthcare-professionals/ace-clinical-guidances-(acgs)
81. Manne-Goehler J, Geldsetzer P, Agoudavi K, et al. Health system performance for people with diabetes in 28 low- and middle-income countries: A cross-sectional study of nationally representative surveys. PLoS Med. 2019;16(3):e1002751. PMID: 30822339 PMCID: PMC6396901 DOI: 10.1371/journal.pmed.1002751