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Diabetes Complications in Low-Income Countries: A Narrative Review

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ABSTRACT

Diabetes has emerged as a major public health challenge in low-income and low- and middle-income countries (LMICs), where its complications contribute disproportionately to morbidity, mortality, and economic burden. This narrative review examines the epidemiology, spectrum, and determinants of diabetes-related complications in low-income settings, with particular emphasis on microvascular and macrovascular outcomes. Drawing on evidence from global and regional studies, the review highlights the high prevalence of diabetic retinopathy, nephropathy, neuropathy, cardiovascular disease, cerebrovascular events, and peripheral artery disease, often presenting at younger ages and more advanced stages than in high-income countries. Structural barriers including weak health system capacity, limited access to essential medicines and diagnostic services, socioeconomic and geographic disparities, and inadequate screening and follow-up-significantly impede prevention and management efforts. The review further explores prevention and management strategies suited to low-resource contexts, including early detection, simplified treatment regimens, integrated complication management programs, community-based education, and task-shifting approaches. Despite growing recognition of the burden of diabetes complications in LMICs, substantial gaps remain in epidemiological data, screening coverage, and long-term outcomes research. Addressing diabetes complications in low-income countries requires coordinated health system reform, equitable access to care, strengthened primary health services, and evidence-informed policy interventions tailored to local contexts.

Keywords: Diabetes complications**,** Low-income countries**,** Microvascular complications**,** Macrovascular complications and Health systems.

INTRODUCTION

Diabetes is increasingly acknowledged as a global epidemic with serious complications affecting health and well-being. As one of the leading causes of death, per the World Health Organization (WHO), it is estimated that 422 million people worldwide have diabetes, and data suggest that half of these cases are in developing nations. Diabetes is expected to rank among the top five causes of death in low- and middle-income countries (LMICs) by 2030[4]. Many of the diabetes-related complications increase the risk of hospitalisation and death and can significantly decrease quality of life, thus reducing productivity and resulting in large economic losses throughout the economy [5]y. The prevalence of diabetes increased due to rapid urbanization, an increasingly sedentary lifestyle, and dietary changes, which all provide rich ground for further investigations [1]. Health Infrastructure and human resources as well as regional variations must be taken into consideration when formulating diabetes management policies. Analysing the implications of global policy reports by the WHO and International Diabetes Federation (IDF) might also provide fruitful insights on the preventive policy options [2]. Understanding the barriers and enablers to the prevention and treatment of diabetes complications in LMICs saves lives and promotes equity [7]. With rapid urbanization shaping people's livelihoods and lifestyles, people encounter a multitude of issues affecting their health, safety and environment at the same time. This brings complications for LMICs where a comprehensive and coherent national policy becomes paramount for citizens' health and quality of life [8].

Epidemiology of Diabetes in Low-Income Countries

Diabetes was responsible for approximately 1.5 million deaths globally in 2019, ranking it as the seventh leading cause of mortality worldwide. Significant variations exist in the burden of diabetes and its microvascular and macrovascular complications across different regions [15]. High-income countries face substantial mortality due to diabetes, but in low and middle-income countries (LMICs), the vast majority of diabetes-related deaths occur due to complications [12]. Preventing microvascular and macrovascular complications resulting from diabetes has emerged as a critical global health objective [18]. Several factors are driving an increase in the global burden of diabetes [9]. The rate of increase in diabetes prevalence has been higher in LMICs than in high-income countries. Moreover, the geography of the diabetes crisis is changing: from 1980 to 2014, the majority of the worldwide increase in the number of people with diabetes occurred in high-income countries, while between 2014 and 2030 more than 80% of the expected increase in the number of people with diabetes is projected to occur in LMICs [19]. There has also been a notable increase in the number of people at risk of developing diabetes: between 1980 and 2014, the prevalence of fasting plasma glucose levels of 5.6-6.9 mmol/L increased by 4% in high-income countries but by 17% in LMICs. In addition, age at diagnosis tends to be younger, with considerable numbers of individuals diagnosed at less than 30 years of age [15]. Urbanisation is also driving the growing diabetes burden in LMICs: the share of people with diabetes living in urban areas is much larger than in high-income countries, and prevalence is significantly higher in urban than in rural settings [16].

Microvascular Complications

Diabetes is a prevalent chronic disease that, if inadequately controlled, can lead to acute and chronic complications. Acute complications, including hypoglycemia (low blood sugar) and diabetic ketoacidosis, leading to increased mortality and morbidity, have been effectively minimized with a focus on education, awareness, and preventive measures [3]. Chronic complications can cause significant healthcare expenditures and severely reduce the quality of life. The complications of diabetes are common, have long-term implications, and are important to understand to improve quality of life for persons with diabetes problems. Retinopathy, nephropathy, and neuropathy are commonly reported problems in Nigerians with type 2 diabetes [18]. Diabetic retinopathy (DR) accounts for 53% of cases. It occurs due to insufficient control of blood sugar levels. DR increases the risk of eye problems such as cataracts and blindness, resulting in additional healthcare costs and loss of productivity [14]. The prevalence of DR in Nigeria, a low and middle-income country (LMIC), remains high due to limited screening services [19]. Diabetic nephropathy (DN) accounts for almost 30% of diabetic complications in Nigeria. DN is caused by an excessive increase in blood sugar levels, leading to damage of the glomerular filtration barrier. Screening and treatment of DN can reduce mortality and slow progression to end-stage renal disease (ESRD). The global prevalence rate of DN in diabetes is set to increase in both developed and DLMCs according to the macroeconomic scenario predicted for 2030 [4]. Diabetic neuropathy (DN), another common complication worldwide can persist even with the optimization of glycemic levels [5].

Retinopathy

Diabetic retinopathy (DR) is a complication caused by damage to blood vessels in the retina due to prolonged hyperglycemia. Diabetic patients are 15–25 times more likely than non-diabetic individuals to become blind; DR constitutes the most common cause of blindness in this population. In low- and middle-income countries, DR affects 18.7% of patients [5]. The progression of DR is strongly associated with two risk factors: control of metabolism and disease duration; the 4-year incidence of further deterioration in early-stage DR, after initiating intensive insulin therapy, can increase from 18.2% to 41.3% when patients start on dialysis [6]. Many low-income nations still lack any organized screening for DR, even though its prevalence is similar to or higher than in more developed areas [10].

Nephropathy

Diabetes-associated nephropathy is defined as persistent albuminuria in a patient with diabetes and has been recognized as a significant complication since the 1980s [10]. Patient's progress through various renal stages: stage 1 entails hyperfiltration, stage 2 presents normal filtration with microalbuminuria, stage 3 is characterized by macroalbuminuria with beginning renal impairment, stage 4 involves significant renal impairment or nephrotic syndrome, and stage 5 indicates end-stage renal failure [9]. The prevalence of albuminuria among adult diabetes patients ranges from 8% to 67% [7], while its prevalence in the sub-Saharan population is reported at 23% 8. Current screening for kidney disease in diabetes patients predominantly employs random urine or protein/creatinine ratio tests [8]. The stages of diabetic nephropathy pose different screening opportunities. Stages 1 and 2, characterized by hyperfiltration and microalbuminuria respectively, offer the greatest benefit for early-stage screening. However, for diabetes patients in low-resource settings, screening programs generally test for macroalbuminuria at steps 3 or 4 instead [9]. Timely early-stage screening is critical, as patients require medications or interventions related to hypertension, nephropathy, or glycemic control only at steps 3 or 4[6]. In

low-resource settings, considerable patient numbers are already entering stage 3 or 4, while glycemic control is the current focus of diabetes management, which does not address hypertension or nephropathy issues [5].

Neuropathy

Diabetic peripheral neuropathy (DPN) is a chronic complication, considered the most prevalent diacomp since its evolution has deleterious effects on the quality of life [7]. In patients with diabetes, DPN develops an incidence of approximately 10% to 90%, reaching different stages of severity [8]. However, because of the inaccurate and insufficient occurrence of nerve damage screening tools in low-income settings, high-resolution data on DPN are lacking [9]. Ethiopia is not an exemption to this scenario; current knowledge and practice regarding screening of DPN in the country is negligible [3]. This review article was purposed to highlight the screening gap of DPN in Low-and middle-income countries including Ethiopia [9]. In a systematic review conducted on twenty three articles, the overall pooled prevalence of DPN among diabetic patients was found to be 45.08%. A similar systematic review in Ethiopia determined a pooled prevalence of 46.28% among diabetes patients. Limited awareness about DPN symptoms and preventive practices aggravates the condition all over Ethiopia [10]. Sensory and motor problems associated with DPN has a great extent to foot deformities and ulcerations and more than 50% of these ulcers lead to amputation[13]. DPN during diabetes compounds the cost of care by draining financial resources to treat its consequences [8]. The goal of this review is to underlie screening practices that can help provide research- based data about DPN linkage with diabetes on national as well as regional level to better fit the DPN preventive framework and improve the quality of diabetic patient's life [15]. Safe and effective DPN screening tools to be applicable by both low and middle income countries and low resource settings were developed in a variety of ways to capture a broad range of aspects during the screening[22].

Macrovascular Complications

Diabetes can be defined as a state of chronic hyperglycemia resulting from impaired insulin secretion, insulin action, or both. It is associated with long-term damage, dysfunction, and failure of various organs, often atherosclerosis [3]. The most common microvascular complications are diabetic retinopathy, diabetic nephropathy, and diabetic neuropathy (Temidayo Ikem et al., 2022). Macrovascular complications, or cardiovascular disease (CVD), cerebrovascular events, and peripheral artery disease (PAD), are also common in patients with diabetes. CVD continues to be the leading cause of morbidity and mortality among people living with diabetes in both developed and developing countries [4]. Worldwide, diabetes incidence and prevalence are on the rise, 15.1% adults aged 25 years or older in the low-income countries (Afewerki, 2021). In Nepal, incorporating a checklist of possible complications in diabetes education and management could be a significant step to increase awareness and better estimation of diabetes-related morbidity in rural and low-income countries (Sharma et al., 2020; Khurshid, 2020)[6].

Cardiovascular Disease

Diabetes increases the risk of developing common macrovascular complications: cardiovascular disease, cerebrovascular events, and peripheral artery disease [1]. Cardiovascular disease leads to nearly 80% of diabetes-related deaths globally. Compared with individuals without diabetes, women with diabetes carry a threefold increased risk of cardiovascular disease mortality, whereas men with diabetes exhibit a twofold risk. Most cardiovascular disease deaths occur in people aged 40 to 70 years [5]. The severe burden of cardiovascular disease among individuals with diabetes emphasizes the importance of risk-factor control [7]. Each country has a different risk-factor profile, and these patterns have evolved over time. In many nations, high blood pressure, smoking, and dyslipidemia are critical factors, whereas in other areas, particularly in patients with type 2 diabetes, obesity and lack of exercise are becoming more prominent drivers of risk. Macromolecular modifications and oxidative stress contribute to diabetes-associated atherosclerosis [15]. The complex pathophysiology of diabetes-associated macrovascular diseases and their interaction with traditional cardiovascular disease risk factors highlight the importance of tailored prevention efforts [13].

Cerebrovascular Events

Cerebrovascular events refer to dysfunctions of the brain due to disease of the blood vessels supplying it [1]. The incidence of cerebrovascular disease in diabetic patients is nearly two-fold greater than that of non-diabetics and the case-fatality rate is around 25% to 50% higher [12]. Current guidelines advocate early screening and intensive management of risk factors for cerebrovascular disease in diabetes patients. Financial constraints and limited availability of some tests restrict management efforts. Furthermore, rehabilitation resources are scarce, resulting in a high burden of disability among survivors [15].

Peripheral Artery Disease

Peripheral artery disease (PAD) is a common circulatory condition in people with diabetes characterized by narrowing of peripheral arteries, reducing blood flow to limbs [9]. Affected individuals may experience lower extremity symptoms, including intermittent claudication [11]. Screening is essential, especially as diabetes

prevalence rises in low-income countries. Access to accurate diagnostic tools and therapeutic resources for disease progression remains limited [10]. PAD prevalence in diabetes patients ranges from 13% to 61% in sub-Saharan Africa, rising to 75% in Uganda. In Ghana, one-third of diabetes patients exhibit PAD-related exertional leg symptoms. Screening in Uganda is recommended as part of diabetes management given the high PAD prevalence [14].

Determinants and Barriers in Low-Income Settings

Diabetes has become a global health emergency affecting all income levels. A systematic review protocol indicated that previous reviews often focus solely on patient adherence or barriers to diabetes care, without analysing data specifically from low- and middle-income countries (LMICs) [13]. None have addressed adherence and barriers from both patient and provider perspectives in LMICs. This review evaluates literature on adherence to five diabetes self-care behaviours diet, exercise, self-monitoring of blood glucose, medication taking, and foot care and the barriers faced by patients and healthcare providers in LMICs [11]. Literature on diabetes and cardiovascular disease showed that both are significant health concerns, especially in low-income settings [1]. The epidemic of coronary heart disease is also growing in low- and middle-income countries [12]. Disparities exist in care quality, management, and control of complications. Access to affordable blood pressure medications varies globally, affecting blood pressure control. Socioeconomic inequalities influence the use of secondary prevention measures for cardiovascular disease [10]. Data from various countries highlight the need for better healthcare strategies and policies to address these determinants and barriers in low-income settings [18].

Health System Capacity

In low-income and middle-income countries (LMICs), health system capacity is frequently cited as a critical barrier to the prevention and management of complications arising from diabetes [12]. Encompassing the physical infrastructure of facilities and equipment, the availability of human resources and trained personnel, and the provision of guidelines and standard operating procedures, the concept refers both to the presence of instruments and procedures and their effective functioning [21]. A variety of determinants, including financial constraints and the epidemiological transition shape facilities, workforce, and the diagnostic and therapeutic tasks performed. In LMICs, diabetes is typically managed within primary care settings, which provide medication for glycaemic control and referral to specialised care [20]. Yet, many patients with diabetes require screening, referral, and ongoing management for complications such as retinopathy and neuropathy [18]. According to country-specific analyses of the World Health Organization's Service Availability and Readiness Assessment, the capacity of primary care clinics to undertake essential screening and diagnostic tests for these complications remains very low in LMICs [15]. The availability of screening, referral, and monitoring programmes is hindered by limited infrastructure and drift of funds toward the management of communicable diseases and other priority noncommunicable diseases that are perceived to be under control[18]. Specific health-system-related barriers include inadequate infrastructure (e.g. absence of eye clinics or dialysis units), shortages of trained personnel, insufficient budget allocations, and poorly functioning referral systems. The relative importance of capacity-building barriers for diabetes care in LMICs needs further investigation [19].

Access to Care and Medication

Low-income countries face critical barriers to diabetes management that severely restrict patient access to care and regular medication [15]. In Indonesia, Peru, Romania, and South Africa, many patients experience poor treatment outcomes, widespread complications, and heightened cardiovascular risk 13. A significant proportion of those deemed clinically eligible for essential therapies such as insulin and drugs targeting hypertension and dyslipidemia receive none of the recommended interventions, and among those who do initiate treatment, only a minority achieve optimal control [15]. Despite rising diabetes prevalence in low- and middle-income countries, the medicines required to manage the disease remain unaffordable to large swathes of the population [15]. Compounding the issue further, numerous constraints long supply chains, healthcare professional shortages, inadequate patient education, and out-of-pocket payment structures, impede medication adherence and fund access to medicines for many lower-income individuals [16].

Socioeconomic and Geographic Disparities

Diabetes is entrenched in urban settings; consequently, low-income housing governs its health risks. Urban slum settings increase the hazard of heightened diabetes prevalence through nutritional transition [16]. Slums have substandard living conditions that impede the low-income population from acquiring basic essentials such as shelter, nutrition, healthcare, and education [15]. They are engines of mortality, morbidity, illiteracy, and infection, and they link to poor health through a multitude of interconnected pathways. Socioeconomic and geographic status interact to determine the effect of urban environments on overall health [15]. Lower-income groups tend to dwell in structurally deficient housing, poorly maintained housing, inadequate-clean water supply,

unhealthy sanitation and waste disposal facilities, and hazardous neighborhood conditions. The health of slum residents remains a national and international concern. Urbanization impacts residents' health more directly than any other form of development [14]. Surveys conducted in the urban population of Indonesia indicate that access to healthcare for lower income population is more constrained [13]. The same situation occurred in the rural population where both public and private healthcare were neither accessible nor affordable, and the problem was aggravated by the rural-urban migration. Significant gaps exist in educational attainment, especially among people who reside in slum settlements. Substantial evidence shows that education levels are associated with health behaviors, leading to better health outcomes [18]. Stronger evidence suggests that education positively influences non-communicable diseases (NCDs) such as diabetes, hypertension, heart attacks, and strokes [1]. Diabetes mellitus does not discriminate against humankind in any terms, yet gender differences exist concerning the nature of the disease and its prevalence. Females accumulate body fat at a higher rate and have the tendency to develop metabolic syndrome at a younger age due to lifestyle, or occupational habits in contrast to males [16]. Health professionals treat many cases of diabetic patients with dots in various health clinics, and genders other than female's exhibit signs pointing to a higher diabetes risk and susceptibility once again suggesting that individuals from different socioeconomic status reflect a disparity [12]. Lack of information leads to a misunderstanding towards diabetes between the socioeconomically advantaged and disadvantaged community around [17].

Prevention and Management Strategies

To prevent and manage diabetes complications in low-income settings, recommendations underscore the importance of early detection, glycemic control, complication management, and education [1]. Complementary to this, broader-system factors such as health system capacity, supply access, and socioeconomic disparities shape these opportunities [15]. Early detection and screening for diabetes complications should target individuals with established diabetes, greater diabetes risk, extensive diabetes duration, or other high-risk conditions [15]. Cost-effective screening is possible for retinopathy, neuropathy, and nephropathy, using modalities widely available in low-income settings. Integrated or coordinated approaches into existing primary care delivery systems, rather than stand-alone programs, increase the feasibility and sustainability of implementation [15]. Emerging diabetes therapies should be fully accessible to meet clinical needs, minimize daily treatment burden, maintain safety across diverse patient populations, and facilitate individualised care [16]. Monitoring adherence across long durations remains key, with affordability, economic pressures, complexity, dosage timing, and knowledge cited as notable barriers [19]. Simplification strategies employ once-daily-or-less regimens, fixed-dose combinations, stepwise regimen designs, adjustment scales, multipurpose formulations, and titration aids to support maintenance of glycaemic control and reduce emergence of complications [18]. Complications management programs encompass screening initiatives based on timely referral policies, pre-existing referral networks, multidisciplinary operations, telecommunication and telemedicine usage, screening modals, priorities within the care continuum, outreach operations, emphasis on national and local services, clinical guideline adoption, and equity metrics[16]. Comprehensive programme coverage leverages information in contemporary studies to enhance collaboration, reduce management delays, and improve disorder-specific patient outcomes [17]. Education targeting patients, families, communities, and organisations should promote diabetes awareness, management, and complication prevention [16]. Peer-to-peer support can sustain knowledge-sharing and behaviours across diverse cultural and professional environments [15]. Physically, emotionally, and financially accessible materials respecting local customs and needs reinforce learning and facilitate adoption of self-management practices. Through strategic planning and engagement, opportunities arise to foster culturally appropriate education and promote empowerment, self-help, peer education, diabetes congress participation, awareness campaigns, and social media platforms [14].

Early Detection and Screening

Diabetes is among the main causes of mortality and morbidity worldwide, with an increasing prevalence in low-income countries [16]. Screening strategies for diabetic retinopathy, one of the most severe microvascular complications of diabetes, are therefore essential for prevention [13]. However, many countries are disadvantaged by lack of policies or guidelines on screening and management of diabetic retinopathy 17. Other common microvascular complications for patients with diabetes are nephropathy and neuropathy. Awareness of the complications, their early detection, assessment of severity, and management of risk factors are crucial in offering appropriate care and preventing progression to more severe forms [18].

Glycemic Control and Medication Adherence

Glycemic control depends critically on access to effective treatment. First-line therapy for type 2 diabetes is metformin, which is generally inexpensive in many low-income settings [13]. Second-line treatments, including sulphonylureas, dipeptidyl peptidase 4 inhibitors, and insulin may be acceptable for patients who are unable to maintain appropriate blood glucose levels on metformin alone, before disease stage or difficult symptoms[15]. The

prices of second-line treatments can be unaffordable for many households, and may either not be available or only available with complicated brand names [12]. Many patients are given medications without proper follow-up information on how to monitor the metabolic outcomes of diabetes medication. Self-monitoring of blood glucose has not been adopted on a large scale in low-income countries [11]. Even when not affordable, buying machines and strips to monitor blood glucose from others outside of the clinic tend to be done, indicating patients remain very interested to remain informed about the consequences of their life style or medication. Simpler regimens can improve adherence to medication widely concept as first, individuals with how many medications complicated regimens gradually find it hard to follow, unless when side effect occurred or when appointment with health professionals to receive education left no choice[16]. In Ghana, only patients receiving two medications tend not to include metformin. In Ethiopia, having more medications and more co-existing diseases tend to lower adherence [11].Strategies to enhance adherence focus on systematic drivers, providing patients clearer perceived economic cost and benefit of medication, enabling non-health professionals manage drug therapy which released attention of health professional from 'cookie-cut-top-down' medication only[19].

Complication Management Programs

Diabetes magnifies the risk of many complications, underscoring the need to establish efficient management frameworks that ensure timely intervention and promote health equity [18]. To facilitate prioritization and enhance access to resources, some countries have implemented complications management programs, launching nationwide screening initiatives that refer patients with abnormal findings to specialized clinics [19]. In setting the agenda for future diabetes research, an operational definition of complications management programs might be: multi-component interventions that include systematic screening for indicators of complications, referrals to specialized care for those with abnormal results, and coordinated care pathways involving multiple disciplines or telemedicine [21]. In low-income countries, complications management programs have been introduced in the Philippines, Indonesia, Peru, Romania, and South Africa [13]. Screening for retinopathy, nephropathy, and neuropathy is integrated into diabetes services, with large patient cohorts monitored at designated facilities that can mobilize teams of ophthalmologists, nephrologists, and neurologists. After screening, follow-ups using telemedicine are arranged for those who cannot return to the clinic. Such initiatives suggest the feasibility of implementing complications management programs in low-income settings [26].

Education and Community Engagement

Diabetes is a major public health concern and an increasingly serious clinical and economic problem faced by nations [18]. Efforts directed towards awareness about diabetes can prevent its complications and poor control. Awareness programs through media or community spokespeople for diabetic awareness has improved knowledge of diabetes among the communities [19]. Community engagement through peer support and community education is effective in addressing barriers to self-management. Community-based education programs targeting rural/suburban areas may help to reach uneducated population [20].

Gaps in Evidence and Research Priorities

Diabetes is a rapidly growing epidemic in LMICs, yet many aspects remain under-researched and poorly understood [1]. Data on diabetes-specific complications, such as screening uptake, awareness, risk factors, and severity are scarce or non-existent for most LMICs [4]. The few available studies demonstrate that micro- and macrovascular complications may affect the vast majority of people with diabetes, exacerbating the poverty-disease cycle [5]. The Indonesian National Health Insurance scheme subsidizes diabetes medication, but lipid-lowering drugs remain largely unaffordable, and screening for nephropathy, retinopathy, and cardiovascular disease is rarely performed. Similar findings have emerged from studies in other low-resource settings, highlighting the urgent need for more comprehensive diabetes epidemiology in LMICs [17].

Policy Implications and Health System Reform

Translating the evidence presented into actionable policy levers is a necessary step towards reducing the burden of diabetes complications and improving health outcomes in LMICs [21-27]. Inadequate financing, limited access to essential medicines, and constraints on achieving Universal Health Coverage represent challenges for health systems [15]. Priority should be given to evidence-informed policies that reduce consumption of and exposure to diabetes risk factors, followed by measures that improve early detection, monitoring, treatment initiation, term treatment adherence, and management of complications. Given the increasing burden of diabetes in LMICs, greater attention to health system reform is warranted [28-30]. Policy options include enhancing financing for NCDs in the wake of the Covid-19 pandemic, expanding the list of essential medications for diabetes and associated conditions, and developing guidelines for expanding universal health coverage to adult diabetes management [21]. Health system reform must address urban-rural differentials through integrated and decentralised approaches that better serve rural populations, thereby decreasing regional inequalities in the provision of prevention and care for diabetes and its complications [31, 32].

CONCLUSION

Diabetes complications represent a critical and escalating public health concern in low-income countries, where health systems are often ill-equipped to manage the growing burden of chronic non-communicable diseases. Both microvascular and macrovascular complications are highly prevalent and frequently diagnosed at advanced stages, contributing to premature mortality, disability, and profound socioeconomic consequences. Limited access to screening, essential medicines, trained healthcare personnel, and referral services exacerbates preventable disease progression and entrenches health inequities. This review underscores the need for integrated, cost-effective strategies that prioritize early detection, sustained glycemic control, and comprehensive complication management within primary healthcare systems. Community engagement, patient education, and peer support are essential complements to clinical interventions, particularly in settings marked by low health literacy and financial hardship. Strengthening health system capacity through workforce training, decentralised service delivery, and improved access to affordable diagnostics and medications is central to reducing the burden of diabetes complications. Future research should focus on generating high-quality, context-specific evidence on complication prevalence, screening effectiveness, and long-term outcomes in low-income settings. Policymakers must translate existing evidence into actionable reforms that expand universal health coverage, reduce socioeconomic and geographic disparities, and ensure sustainable financing for diabetes care. Without such coordinated efforts, diabetes complications will continue to undermine health, productivity, and development in low-income countries.

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