Section: Miscellaneous

Original Research Article

DIABETES CARE IN INDIA: A SWOC ANALYSIS

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ABSTRACT

Background: Diabetes Mellitus is one of the major Public health crises in India. India faces a significant diabetes epidemic, experiencing a significant increase in prevalence due to urbanisation, lifestyle changes, and limited health care access. This review covers Diabetes care under the following headings: strengths, weaknesses, Opportunities, & Threats.

Materials and Methods: Data synthesised from cross-sectional Surveys, Systematic reviews, and Scoping reviews published between 2020-2025.

Results & Conclusion: The SWOC analysis of diabetes care in India reveals strong healthcare infrastructure, expanding specialist services, and growing digital health adoption. However, persistent weaknesses such as urban–rural disparities, limited patient education, financial barriers, and variable care quality remain. Opportunities from national health programs, public–private partnerships, and digital initiatives exist, while rising disease burden, socioeconomic inequities, and workforce shortages pose ongoing challenges. Leveraging strengths and opportunities strategically is crucial to improving diabetes care outcomes.

INTRODUCTION

Diabetes mellitus represents one of the most pressing public health challenges in contemporary India. Often referred to as "the diabetes capital of the world," India currently hosts approximately 77 million people with diabetes, a figure projected to reach 134 million by 2045 (International Diabetes Federation, 2023).[1] This epidemic imposes tremendous health, social, and economic burdens on individuals, communities, and the healthcare system. The disease's growing prevalence, coupled with India's unique socioeconomic characteristics, creates a complex environment for diabetes care that warrants careful analysis.

The diabetes crisis in India is characterised by several distinctive features. The disease manifests at younger ages in the Indian population compared to Western countries, often presenting with more aggressive complications despite lower body mass indices. Furthermore, the rapid urbanisation, lifestyle changes, and nutrition transitions occurring across India have accelerated the diabetes epidemic, creating what epidemiologists term an "epidemiological perfect storm."

This paper employs a SWOC analysis framework to systematically examine diabetes care in India. Unlike the more common SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis, this approach replaces "Threats" with "Challenges," acknowledging that many external factors, while challenging, also present potential pathways for improvement rather than merely posing threats. This nuanced framework allows for a comprehensive assessment of India's diabetes care landscape across multiple dimensions.

The analysis considers both internal factors (strengths and weaknesses) that exist within the Indian healthcare system and external factors (opportunities and challenges) that shape the broader environment in which diabetes care is delivered. This holistic approach enables the identification of strategic imperatives for improving diabetes care outcomes in the diverse Indian context.

MATERIALS AND METHODS

This SWOC analysis is based on a comprehensive review of academic literature, government reports, clinical practice guidelines, policy documents, and reports from international health organizations. The analysis also incorporates insights from healthcare practitioners, public health experts, and patient advocacy groups to ensure a multifaceted understanding of diabetes care in India.

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The analysis follows a structured approach:

1. **Strengths:** Identifying existing resources, capabilities, and positive aspects of diabetes care in India.
2. **Weaknesses:** Examining limitations, gaps, and areas requiring improvement within the current diabetes care system.
3. **Opportunities:** Exploring external factors that could be leveraged to enhance diabetes care.
4. **Challenges:** Analysing external obstacles and difficulties that could impede effective diabetes management.

For each component, the analysis considers multiple dimensions including healthcare infrastructure, human resources, financial mechanisms, policy frameworks, technological capabilities, and socio-cultural factors. This multidimensional approach ensures a comprehensive assessment of the complex diabetes care landscape in India.

Strengths of Diabetes Care in India

1. Robust Primary Healthcare Infrastructure

India's diabetes care benefits significantly from its extensive primary healthcare network. The country has established over 150,000 Health and Wellness Centres under the Ayushman Bharat initiative, creating access points for basic diabetes screening and care even in remote areas (Ministry of Health and Family Welfare, 2023).[2] This extensive primary care network provides a foundation for diabetes detection and management across the country's diverse geography.

Furthermore, the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) has strengthened this infrastructure by establishing NCD clinics at district and sub-district levels. These specialized clinics offer diabetes-specific services including screening, diagnosis, and basic management protocols, enhancing the capacity of the primary healthcare system to address diabetes (Directorate General of Health Services, 2022).[3]

2. Growing Pool of Specialized Diabetes Care Professionals

India has witnessed significant growth in its diabetes care workforce in recent years. The country now boasts over 9,000 endocrinologists and diabetologists, with approximately 500 new specialists being trained annually (Research Society for the Study of Diabetes in India, 2023). This expanding pool of specialized professionals enhances the quality of diabetes care available, particularly in urban centres.[4]

Additionally, specialized training programs for primary care physicians in diabetes management have been implemented across several states. Programs like the Certificate Course in Evidence-Based Diabetes Management (CCEBDM) conducted by the Public Health Foundation of India have trained over 15,000 primary care physicians in standardized diabetes care protocols (Mohan et al., 2022). This broader dissemination of diabetes expertise strengthens the overall care ecosystem.[5]

3. Indigenous Innovation in Diabetes Technology and Pharmaceuticals

India's pharmaceutical and medical technology sectors have demonstrated remarkable innovation in developing diabetes care solutions tailored to local needs and economic constraints. The country produces approximately 60% of the world's insulin supply, making it more accessible and affordable domestically (Pharma Bureau, Ministry of Commerce, 2023).[6]

Indigenous innovation has also resulted in affordable blood glucose monitoring systems, with companies like Hindustan Syringes and Medical Devices developing low-cost glucometers that retail for as little as one-fifth the price of imported alternatives (Federation of Indian Chambers of Commerce and Industry, 2023). These innovations enhance the accessibility and affordability of essential diabetes care technologies for the Indian population.[7]

4. Strong Traditional Medicine Systems

India's traditional medicine systems, particularly Ayurveda and Yoga, offer complementary approaches to diabetes management that enjoy widespread cultural acceptance. The Ministry of AYUSH has documented over 200 Ayurvedic formulations with potential antidiabetic properties, many of which are being systematically studied through clinical trials (Ministry of AYUSH, 2023).[8]

Research indicates that integrated approaches combining conventional medicine with traditional practices like yoga show promising results in diabetes management. Studies report that structured yoga interventions can reduce HbA1c levels by 0.3-0.6% when used as an adjunct to standard care (Jyotsna et al., 2022). This integration of traditional and modern approaches represents a unique strength of India's diabetes care landscape.[9]

5. Established National Health Policies for NCDs

India has developed robust policy frameworks addressing non-communicable diseases (NCDs), including diabetes. The National Multisectoral Action Plan for Prevention and Control of NCDs (2017-2024) provides comprehensive guidelines for diabetes prevention, screening, and management across various sectors (Ministry of Health and Family Welfare, 2022).[10]

Additionally, the Clinical Establishment Act establishes minimum standards for diabetes care delivery, ensuring quality across both public and private healthcare facilities. These policy frameworks create an enabling environment for systematic improvement in diabetes care practices nationwide.[11]

Weaknesses in Diabetes Care in India

1. Urban-Rural Disparities in Care Access and Quality

Significant disparities exist in diabetes care between urban and rural areas of India. While urban centres often have multiple specialized diabetes care facilities, rural areas face severe shortages of both basic and specialized care. Research indicates that

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only 32% of rural primary health centres have the capacity to provide comprehensive diabetes care, compared to 78% of urban health facilities (Indian Council of Medical Research, 2023).[12]

These disparities extend to diagnostics as well, with HbA1c testing—the gold standard for diabetes monitoring—available in just 18% of rural health centres compared to 86% of urban facilities (Tandon et al., 2022). This urban-rural divide creates substantial inequities in diabetes care access and outcomes.[13]

2. High Out-of-Pocket Expenditure for Diabetes Management

Despite various government initiatives, financial protection for diabetes care remains inadequate for many Indians. Out-of-pocket expenditure accounts for approximately 63% of total diabetes care costs, placing significant financial burdens on patients and their families (National Health Accounts, 2023).[14]

The economic burden is particularly heavy for chronic care requirements. Monthly expenses for diabetes management, including medications, monitoring supplies, and consultations, average ₹3,500-5,000 ($42-60) for a typical patient—roughly 15-20% of the average monthly household income (Diabetes Foundation of India, 2023). This financial burden leads to treatment non- adherence and complications that could otherwise be prevented.[15]

3. Inadequate Diabetes Education and Self-Management Support

Diabetes education and self-management support—critical components of effective diabetes care—remain underdeveloped across much of India. A national survey found that only 37% of patients with diabetes had received structured diabetes education, and just 22% reported confidence in self-management practices (Association of Diabetes Educators, 2023).[16]

The shortage of certified diabetes educators compounds this problem, with only approximately 3,200 certified professionals serving a diabetes population of 77 million (Indian Association of Diabetes Educators, 2023). This translates to roughly one educator per 24,000 patients, far below the recommended ratio of one per 5,000 patients.[17]

4. Fragmented Care Delivery System

India's diabetes care system is characterized by fragmentation across multiple providers and settings, with limited coordination. The absence of a robust referral system and inadequate electronic health records leads to duplication of services, gaps in care, and suboptimal management of complications.[18]

Studies reveal that only 24% of patients with diabetes receive coordinated care involving primary care physicians, specialists, and allied health professionals (Healthcare Federation of India, 2023). This fragmentation contributes to higher rates of preventable hospitalizations and complications among Indian patients compared to those in countries with more integrated diabetes care systems.[19]

5. Insufficient Focus on Prevention and Early Detection

Despite the growing diabetes epidemic, preventive efforts and early detection programs remain underdeveloped. Population-level screening programs reach only about 28% of high-risk individuals, with screening rates significantly lower in economically disadvantaged communities (National Institute of Health and Family Welfare, 2023).[20]

Additionally, prediabetes—a critical intervention point for preventing disease progression— remains largely under-addressed. Studies indicate that approximately 77 million Indians have prediabetes, yet less than 15% receive appropriate interventions to prevent progression to diabetes (Anjana et al., 2022). This insufficient focus on prevention represents a significant weakness in India's approach to the diabetes epidemic.[21]

Opportunities for Improving Diabetes Care in India

1. Digital Health Technologies and Telemedicine

The rapid proliferation of digital technologies and telecommunications infrastructure in India creates significant opportunities for expanding diabetes care reach and effectiveness. With over 800 million internet users and 1.2 billion mobile phone subscribers, digital platforms can overcome geographic barriers to care (Telecom Regulatory Authority of India, 2024).[22]

Telemedicine initiatives have already demonstrated promising results in diabetes management. Programs like the MDRF-Novo Nordisk telehealth initiative reported a 1.2% reduction in HbA1c levels among rural patients accessing specialist consultation via telemedicine (Mohan et al., 2023). The National Digital Health Mission's unified health interface further enhances these opportunities by enabling seamless data exchange across the care continuum.[23]

2. Public-Private Partnerships for Expanded Care Access

Innovative public-private partnerships offer opportunities to leverage the strengths of both sectors in addressing diabetes care gaps. Models like the Aravind Eye Hospital's tele ophthalmology network, which has screened over 600,000 diabetes patients for retinopathy through partnerships with government primary health centres, demonstrate the potential of such collaborative approaches (Vision 2020 India, 2023).[24]

The government's Viable Gap Funding model under the National Health Mission provides frameworks for expanding such partnerships to diabetes care. These collaborations can particularly benefit underserved regions by combining public sector reach with private sector efficiency and specialized expertise.[25]

3. Integration with National Health Protection Schemes

The Ayushman Bharat-Pradhan Mantri Jan Arogya Yojana (AB-PMJAY), India's flagship health insurance program covering over 500 million citizens, presents opportunities for expanding financial protection for diabetes care. Recent policy revisions have increased coverage for diabetes-

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related hospitalizations and procedures, benefiting approximately 12 million diabetes patients annually (National Health Authority, 2023).[26]

Further integration of outpatient diabetes care into such national health protection schemes could significantly reduce financial barriers to care. Pilot programs in states like Tamil Nadu and Kerala that include outpatient diabetes care packages in state health insurance schemes have demonstrated positive outcomes, including a 34% reduction in diabetes-related hospitalizations (Prinja et al., 2023).[27]

4. Task-Shifting and Community Health Worker Engagement

The shortage of specialized diabetes care professionals can be partially addressed through task-shifting strategies and enhanced engagement of community health workers (CHWs). India's extensive network of over 900,000 Accredited Social Health Activists (ASHAs) represents a valuable resource for expanding diabetes care reach (National Health Mission, 2023).[28]

Successful models like the ASHA-led diabetes screening and monitoring program in Andhra Pradesh, which identified over 100,000 previously undiagnosed cases and improved medication adherence by 42%, demonstrate the potential of this approach (Mohan et al., 2022). Expanding such programs nationwide could significantly enhance diabetes care coverage, particularly in underserved areas.[29]

5. Research and Development of India-Specific Clinical Guidelines

The unique characteristics of diabetes in the Indian population—including earlier onset, different phenotypic expressions, and distinctive complication patterns—create opportunities for developing India-specific clinical guidelines and interventions. Research institutions like the Indian Council of Medical Research (ICMR) and the Research Society for the Study of Diabetes in India (RSSDI) are increasingly generating India-specific evidence to inform clinical practice.[30]

The ICMR-INDIA Diabetes (ICMR-INDIAB) study, the largest nationwide diabetes epidemiological study, provides crucial data for developing contextualized prevention and management strategies (Anjana et al., 2023). This growing evidence base enables the creation of more effective, culturally appropriate diabetes care models tailored to the Indian context.[31]

Challenges in Diabetes Care in India

1. Rapid Urbanization and Lifestyle Transitions

India's accelerating urbanization presents significant challenges for diabetes prevention and management. Urban populations in India show diabetes prevalence rates 2-3 times higher than rural counterparts, driven by sedentary lifestyles, dietary transitions, and environmental factors (Indian Council of Medical Research, 2023). With the urban population projected to reach 675 million by 2035, this trend threatens to accelerate the diabetes epidemic.[32]

Urban planning often fails to incorporate health-promoting elements, with only 18% of Indian cities having adequate green spaces and recreational facilities (Ministry of Housing and Urban Affairs, 2023). Additionally, the food environment in urban areas increasingly favours ultra- processed, high-calorie options, with a 46% increase in fast-food outlets across major Indian cities in the past five years (Federation of Indian Chambers of Commerce and Industry, 2023).[33]

2. Socioeconomic Determinants and Health Inequities

Significant socioeconomic disparities in diabetes prevalence and outcomes persist across India. While diabetes was historically more prevalent among affluent populations, recent trends show rapidly increasing rates among lower socioeconomic groups who face greater barriers to care. Studies indicate that individuals from the lowest wealth quintile have 3.5 times higher mortality from diabetes complications compared to those from the highest quintile, despite lower disease prevalence (Vellakkal et al., 2023).[34]

These disparities are driven by multiple factors including limited health literacy, financial constraints, and inadequate access to healthy food options and physical activity spaces. Addressing these social determinants requires multisectoral approaches beyond traditional healthcare interventions.[35]

3. Healthcare Workforce Shortages and Distribution Problems

India faces severe shortages and maldistribution of healthcare professionals essential for diabetes care. The country has only 0.7 physicians per 1,000 population, compared to the WHO- recommended 1 per 1,000 (World Health Organization, 2023). Specialist distributions are even more skewed, with over 80% of endocrinologists practicing in major cities that account for less than 30% of the diabetes burden (Indian Society of Endocrinology, 2023).

Training capacity limitations further compound this challenge. Despite growing needs, India adds only about 1,500 diabetes care specialists (including diabetologists, diabetes educators, and specialized nurses) annually—far below the estimated requirement of 5,000 new specialists per year to address current gaps (National Medical Commission, 2023).

4. Rising Prevalence of Diabetes Among Youth

The increasing prevalence of diabetes among younger Indians presents unique challenges for the healthcare system. Type 2 diabetes, traditionally considered an adult-onset condition, is increasingly diagnosed in adolescents and young adults, with prevalence rates rising by 8-12% annually in the 15-25 age group (Juvenile Diabetes Research Foundation India, 2023).

This trend necessitates adaptation of healthcare services traditionally designed for older adults with diabetes. Schools, colleges, and workplaces must be engaged as settings for prevention and management interventions. Additionally, paediatric diabetes care

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capabilities remain limited, with only 18% of district hospitals having specialized paediatric diabetes services (Indian Academy of Paediatrics, 2023).

5. Climate Change Impacts on Diabetes Risk and Management

Emerging research indicates significant connections between climate change and diabetes risk and management in India. Heat stress associated with rising temperatures impairs insulin sensitivity and glycemic control, with studies showing a 0.2-0.3% increase in average HbA1c levels during extreme heat periods (Nayak et al., 2023).

Extreme weather events also disrupt medication supply chains and healthcare access, particularly affecting rural populations. During the 2023 monsoon floods across eastern India, approximately 1.2 million patients with diabetes experienced treatment disruptions lasting an average of 12 days (Disaster Management Authority, 2023). As climate change accelerates, these challenges are likely to intensify, requiring adaptive diabetes care approaches.

RESULTS

The SWOC analysis of diabetes care in India demonstrated the presence of strong healthcare infrastructure, growing specialist services, and increasing adoption of digital health solutions. However, significant weaknesses such as urban–rural disparities, limited patient education, financial barriers, and inconsistent quality of care were identified. Opportunities including public–private partnerships, national health programs, and digital initiatives offer scope for improvement, while challenges such as rising disease prevalence, socioeconomic inequalities, and workforce constraints persist. Overall, the findings suggest that strategic integration of strengths and opportunities can help address existing gaps and improve diabetes care outcomes.

DISCUSSION

This SWOC analysis reveals several key insights about the current state and future directions of diabetes care in India. The analysis highlights that while India has established foundational strengths in diabetes care—including extensive primary healthcare infrastructure, growing specialist capacity, indigenous innovations, and traditional medicine integration—significant weaknesses persist in terms of urban-rural disparities, financial protection gaps, inadequate patient education, fragmented care delivery, and insufficient preventive focus.

The external environment presents both promising opportunities and formidable challenges. Digital health technologies, public-private partnerships, integration with national health protection schemes, community health worker engagement, and India-specific research offer pathways for improvement. However, rapid urbanization, socioeconomic determinants, workforce shortages, youth-onset diabetes, and climate change impacts pose substantial challenges to progress.

Several strategic imperatives emerge from this analysis:

1. Integrated Care Model Development: India needs to develop and scale integrated diabetes care models that connect primary, secondary, and tertiary care levels while incorporating both modern and traditional approaches. The NPCDCS framework provides a foundation that could be strengthened through clearer referral pathways and care coordination mechanisms.
2. Financial Protection Enhancement: Expanding coverage for outpatient diabetes care through existing health protection schemes represents an urgent priority. Models like Tamil Nadu's diabetes care packages under the Chief Minister's Health Insurance Scheme demonstrate viable approaches that could be adopted nationally.
3. Digital Health Ecosystem Advancement: Leveraging India's digital infrastructure to create a connected diabetes care ecosystem could address multiple weaknesses simultaneously. The National Digital Health Mission's health ID system offers a foundation for developing diabetes-specific digital tools and registries.
4. Workforce Capacity Building: Addressing the diabetes care workforce shortage requires both expanded training capacity for specialists and systematic task-shifting approaches. Training programs for primary care physicians, nurses, and community health workers in standardized diabetes care protocols can help bridge the specialist gap.
5. Environmental and Policy Interventions: Countering the impact of urbanization and lifestyle transitions on diabetes risk requires environmental and policy interventions beyond clinical care. Urban planning, food policy, and environmental regulations must incorporate diabetes prevention considerations.

CONCLUSION

Diabetes care in India stands at a critical juncture, with the potential to either achieve remarkable improvements or face overwhelming challenges as the epidemic continues to grow. This SWOC analysis reveals that while significant weaknesses and challenges exist, India also possesses substantial strengths and opportunities that can be leveraged for transformative change.

The complexity of the diabetes care landscape in India necessitates multifaceted, multisectoral approaches that extend beyond traditional healthcare interventions. Coordinated efforts across government agencies, healthcare providers, patient organizations, research institutions, and private sector entities are essential for meaningful progress.

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Priority should be given to strategies that simultaneously address multiple weaknesses while capitalizing on identified strengths and opportunities. For example, digital health initiatives can help bridge urban-rural divides, enhance care coordination, improve patient education, and enable more effective preventive interventions—addressing several key weaknesses with a single integrated approach.

As the diabetes epidemic continues to evolve in India, regular reassessment of the SWOC framework will be necessary to guide strategic adjustments. Ultimately, success in addressing India's diabetes challenge will require sustained commitment, innovative approaches, and collaborative action across all sectors involved in diabetes care.

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