Improving Stroke Care in Low- and Middle-Income Countries: Challenges, Opportunities, and Strategies for Global Equity

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Abstract

Stroke is a major public health challenge worldwide, and its burden falls disproportionately on low- and middle-income countries (LMICs), where mortality and long-term disability rates remain significantly higher than in high-income nations[1–4]. Despite the availability of effective and evidence-based interventions, such as timely thrombolysis, organised stroke units, and structured rehabilitation programmes[5], access to high-quality stroke care remains deeply uneven. Limited public awareness, delays in pre-hospital response, inadequate emergency systems, insufficient diagnostic imaging[5], high treatment costs, workforce shortages, and restricted rehabilitation services contribute to poor outcomes. This article examines the global epidemiology of stroke[1–4], outlines major barriers to improving care[5], and highlights innovative, scalable solutions for prevention, acute treatment, and long-term recovery[6,7]. Emphasis is placed on community education, telemedicine expansion[6], task-shifting, affordable system improvements, and comprehensive national policies. By adopting a global-equity framework and investing in sustainable stroke pathways, LMICs have substantial potential to reduce preventable mortality and disability[1–4] while improving long-term wellbeing.

KEYWORDS: STROKE; LOW- AND MIDDLE-INCOME COUNTRIES; GLOBAL HEALTH; THROMBOLYSIS; REHABILITATION; EMERGENCY MEDICAL CARE; TELEMEDICINE; HEALTH EQUITY.

Key Messages

- Over 80% of global stroke deaths occur in LMICs[1–4].
- Barriers extend across the entire care continuum, from recognition to rehabilitation[5].
- Telemedicine, task-shifting, and community rehabilitation offer scalable solutions[6,7].
- Policy reform and health financing are essential for sustainable improvement[7].
- Advancing stroke equity is a public health and moral imperative.

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1. Introduction

Stroke has become one of the most significant contributors to global mortality and disability[1–4]. Its impact continues to grow as LMIC populations age and non-communicable diseases (NCDs) rise sharply[2–4]. More than 80% of global stroke deaths now occur in LMICs[1–4], reflecting epidemiological transition, socioeconomic inequality, and uneven health-system development. High-income countries have made progress in prevention and acute treatment, but LMICs continue to face challenges such as limited access to diagnostic tools, weak emergency systems, and insufficient workforce capacity[5]. Yet, scalable and cost-effective solutions are increasingly recognised[6], offering meaningful opportunities for improving outcomes.

2. Epidemiology and Burden of Stroke in LMICs

Stroke incidence, prevalence, and mortality have risen markedly in LMICs over recent decades[1–3]. This surge is driven by population ageing, urbanisation, changing lifestyles, and the growing prevalence of hypertension, diabetes, obesity, and smoking[2–4]. Many LMICs now confront a dual disease burden: persistent infectious disease alongside rising cardiovascular and cerebrovascular conditions[3].

Stroke also affects patients at younger ages in LMICs compared with high-income countries[4], contributing to long-term economic strain, reduced productivity, and increased dependency. These interlocking factors establish stroke as a profound medical and socioeconomic challenge in LMIC settings[1–4].

3. Barriers Across the Stroke Care Continuum

Delivering effective stroke care requires timely action from symptom onset through acute management and rehabilitation. In LMICs, barriers exist at every stage[5].

Public awareness of stroke symptoms is low, and misconceptions—such as attributing symptoms to spiritual or temporary conditions—delay recognition and emergency response[5]. Traditional healers are often consulted first, particularly in rural areas. Emergency medical systems (EMS) remain underdeveloped: shortages of ambulances, poorly trained personnel, long travel distances, poor road quality, and high transport costs limit timely access to care[5].

Diagnostic imaging is essential for distinguishing ischaemic from haemorrhagic stroke, yet CT and MRI availability is limited[5]. Even where equipment exists, issues such as power outages, maintenance gaps, insufficient staffing, and unaffordable imaging fees further restrict access.

Thrombolysis remains underutilised due to medication costs, limited clinician training, and the absence of organised stroke pathways[5]. Mechanical thrombectomy is even less accessible due to specialist shortages and high equipment requirements[5].

Rehabilitation services are also severely limited. Early and continuous rehabilitation improves outcomes, but therapists are scarce, and facilities are concentrated in urban centres[7]. Out-of-pocket costs are prohibitive for many families, and disability-related stigma further impedes reintegration.

These barriers are compounded by systemic constraints: low health literacy, prioritisation of infectious disease over NCDs, and widespread workforce shortages[5,7].

4. Opportunities for Improving Stroke Care in LMICs

Despite these challenges, several promising opportunities exist for strengthening stroke care.

Community education can significantly improve symptom recognition and reduce pre-hospital delays[6]. Awareness campaigns using radio, schools, community groups, and faith networks have shown effectiveness in improving early presentation.

Workforce development and task-shifting play vital roles in expanding capacity[7]. Training general practitioners, nurses, and community health workers in stroke triage and management compensates for neurologist shortages. Standardised stroke protocols support consistent quality of care.

Telemedicine offers a transformative solution[6]. Hub-and-spoke tele-stroke networks connect district hospitals with tertiary specialists, enabling remote diagnosis, thrombolysis decision support, and rapid care coordination. Pilot programmes demonstrate telemedicine's feasibility even in remote LMIC regions[6]. Strengthening emergency transport through low-cost innovations—motorbike ambulances, community driver networks, or simplified mobile stroke units—can reduce delays[6]. Drone delivery of medicines and diagnostics is emerging as a promising complementary strategy[6].

Expanding rehabilitation access is essential. Community-based rehabilitation, digital rehabilitation tools, caregiver training, and peer-support networks all improve outcomes at low cost[7].

5. Policy, Financing, and the Path Toward Global Equity

Sustainable improvement requires coordinated policy reform and investment.

National NCD strategies must include stroke explicitly[7]. Universal health coverage can reduce catastrophic health expenditure by expanding access to imaging, medications, and rehabilitation. Governments should support infrastructure development, equipment maintenance, and drug procurement.

Cross-sector partnerships—including NGOs, academia, international health agencies, and technology providers—can accelerate innovation, workforce training, and research[6]. Regional collaboration helps share expertise, enable telemedicine networks, and improve procurement efficiency.

6. Conclusion

Stroke represents one of the most pressing global health challenges, disproportionately impacting LMICs[1–4]. Although the current landscape includes major gaps in awareness, acute care, and rehabilitation, the potential for meaningful improvement is substantial. Community education, workforce development, telemedicine models, innovative transport solutions, and rehabilitation expansion offer viable paths toward more equitable care[6,7]. Policy reforms, financial investment, and international collaboration are essential to ensure these opportunities translate into real-world progress. Ultimately, advancing stroke equity is a clinical, public-health, and humanitarian imperative.

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