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PERSPECTIVE PAPER

# Health system resilience and policy adaptation following funding reductions in low- and middle-income countries

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## ABSTRACT

The sustainability of health systems in low- and middle-income countries (LMICs) faces unprecedented challenges as major donors reduce funding. These cuts threaten critical health services, exacerbating existing gaps in disease surveillance, healthcare access, and workforce capacity. A narrative review informs this perspective of peer-reviewed literature, policy reports, and illustrates country studies. It synthesizes evidence and expert opinion to identify actionable strategies for building resilience in LMIC health systems. LMICs confront multiple interconnected challenges. Fragile health financing, marked by over-reliance on donor aid, has disrupted essential services. Severe workforce shortages limit training and retention of skilled health workers, while stark digital and inequity divides leave rural and marginalized populations behind. For instance, Kenya's M-Tiba mobile health platform expanded access for millions, yet women remain 30% less likely to own smartphones. Climate change further strains systems, with rising malaria transmission in Kenya and deadly heatwaves in India. While initiatives such as Uganda's DHIS2 and Rwanda's Starlink partnerships illustrate progress in disease surveillance and digital access. LMICs must adopt multifaceted resilience strategies. Strengthening domestic resource mobilization and governance reforms is essential to reduce dependency on volatile aid. Equally, critical are investments in human resources, scaling of digital infrastructure, and institutionalizing multi-sectoral collaborations. Combating corruption and ensuring transparent governance remain non-negotiable. Aligning these reforms with the Sustainable Development Goals (SDGs) and Africa CDC's new financing guidelines will be vital to safeguarding health systems against future shocks. The time for LMICs to build self-reliant, adaptive health systems is now.

**KEYWORDS:**

Climate Change, Domestic Resource Mobilization, Health System Resilience, Healthcare Access, Public-Private Partnerships, Sustainable Financing, Technology, Vulnerable Populations, Workforce Capacity, World Health Organization

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# INTRODUCTION

The resilience of health systems in low-and middle-income countries (LMICs) has become a focal point of concern, particularly in a recent reduction in funding from organizations such as the United States Agency for International Development (USAID) and the UK's Department for International Development (DFID) [primary sources of earmarked funding], Global Financing Facility (GFF), Pandemic Emergency Financing Facility (PEF), International Monetary Fund (IMF), World Health Organization (WHO), Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM), and others. These organizations mobilize resources for fighting malaria tuberculosis and HIV/AIDS, pandemic response, support reproductivity, maternal, newborn, child, adolescent healthcare, help in poverty reduction, and influence domestic health policies.[1] These funding cuts pose significant challenges to systemic resilience, sustainability and effectiveness of healthcare delivery, causing urgent policy adaptations to mitigate their impact. As LMICs grapple with limited resources and evolving public health demands, a critical examination of innovative strategies is essential to strengthen health systems and ensure continued access to healthcare, as shown in Table1 and Figure 1.

**Table 1.** Investment in health system resilience

| Country | Investment USD | Year | Focus Area |
|---|---|---|---|
| Rwanda | 150 million | 2023 | Community health programs |
| Kenya | 200 million | 2024 | Digital health initiatives |
| Bangladesh | 100 million | 2023 | Emergency preparedness |

*Reference: United Nations Development Programme. (2020). COVID-19 and the SDGs: A guide for practitioners. Retrieved from UNDP Publications*

This perspective paper explores multifaceted approaches necessary for enhancing health system resilience, emphasizing integration of non-communicable diseases (NCD) management into primary healthcare, domestic mobilization of resources, the role of public-private partnerships (PPP), and the use of digital health solutions. The COVID-19 pandemic highlighted the vulnerabilities within LMICs health systems, as NCDs account for a substantial burden of morbidity and mortality in these regions.[2] By adopting comprehensive strategies that addresses both infectious diseases and NCDs, LMICs can enhance health security while reducing the economic strain on healthcare systems. This aligns with SDG 3: Good Health and Well-being, which aims to ensure healthy lives and promote well-being for all ages. Moreover, engaging communities in health management fosters improved health literacy and outcomes, contributing to the long-term sustainability of health services, which is essential for achieving SDG 4: Quality Education.[3]

Public-private partnerships can drive innovation and resource mobilization, allowing development of targeted health solutions that are responsive to local needs. For instance, successful collaborations in countries like Kenya and India have shown how partnerships can enhance service delivery and health outcomes, which is in a line with SDG 17: Partnerships for the Goals.[4-6] The LMICs can mobilize funds to promote health issues in the following ways: Alternative Financing Mechanisms (Health System Resilience), Health-specific taxation (e.g., sin taxes on tobacco, alcohol, or sugary drinks), National Health Insurance Schemes (NHIS), as well as Social and Health Impact Bonds (SHIB). This enables LMICs Pool risks and resources to reduce dependency on donor flows.

Technological advancements also play a pivotal role in enhancing resilience funding reductions. Digital health solutions, such as telemedicine and mobile health applications, can bridge gaps in service delivery, particularly in remote areas, thereby contributing to SDG 9: Industry, Innovation, and Infrastructure.[7] However, without reliable electricity and internet connectivity, resilient digital appliances with technical expertise, implementation may be difficult, especially in the rural settings.

Furthermore, cultivating local leadership and governance structures empowers communities to actively participate in health decision-making, thereby reinforcing the adaptability of health systems. It is crucial to engage a diverse range of stakeholders, including local governments, NGOs, and community organizations, to ensure that health services and

interventions are contextually relevant and fair, held accountable, and without corruption.

As environmental factors increasingly influence health outcomes, addressing the impact of climate change on health systems is essential, aligning with SDG 13: Climate Action, by incorporating strategies that enhance resilience to climate-related challenges. Climate change affects health system in LMICs. Rising temperatures increase the range of vector-borne diseases such as malaria and zika). Also, flooding and poor sanitation increase waterborne diseases such as cholera and diarrhoea. There is a need for LMICs to integrate climate and health adaptation into national health policies and strengthen early warning systems for climate-related disease outbreaks. To ensure continuity of mitigation, LMICs should allocate climate financing to health, such as through the Green Climate Fund and climate-health bonds.[8]

Ultimately, culture of continuous learning and adaptation within health governance frameworks is essential for ensuring fair healthcare access and improving health outcomes in line with SDG 10: Reduced Inequalities and SDG 16: Peace, Justice, and Strong Institutions.

## METHODS

This paper is a perspective piece that draws on a narrative review of published literature, policy documents, and donor reports between 2015 and 2024. Sources included PubMed-indexed articles, WHO and World Bank publications. Studies from Africa and Asia were purposively selected to illustrate both successful strategies (e.g., Rwanda's digital health partnerships, Ghana's drone-supported supply chains) and challenges or unintended consequences (e.g., Malawi's treatment interruptions following donor withdrawal, persistent inequities in mobile health adoption).

The intent is to identify practical, policy-relevant strategies that can inform decision-making and align with global frameworks such as the WHO health systems building blocks, UHC2030, and the Africa CDC financing guidelines.

### Challenges and strategies

This paper is organized around the six building blocks of the World Health Organization (WHO) framework: financing, governance, service delivery, workforce, information systems, and access to medicines and technologies, see tables 2 and 3.

### Health Financing

Over-reliance on donor funding has left many LMIC health systems highly vulnerable to external shocks. Recent reductions in support from USAID and DFID threaten to reverse decades of progress, as demonstrated in Zambia where diabetes and hypertension programs collapsed post-funding cuts, or Malawi where a 15% reduction in support led to ART stockouts and treatment interruptions by 30%.[9] Ghana's NHIS offers an example of diversification through earmarked taxes,[10] while India's "Utkrisht" HIB demonstrated how performance-based financing can strengthen maternal health outcomes.[11] Yet counter examples exist of pooled procurement systems in some settings, and have been undermined by corruption and logistical bottlenecks, reducing efficiency rather than improving it.

To reduce aid dependency, LMICs must prioritize domestic resource mobilization (DRM), with Rwanda committing 15% of its budget to health.[9] Expanding PPPs has also helped mobilize resources, as seen in Kenya's PPP projects in infrastructure and service delivery.[12] though in other contexts PPPs increased out-of-pocket costs for the poor. Innovative financing, including health insurance and bonds, can further diversify funding. However, transparency and governance reforms are essential to avoid misuse of new revenue streams.

### Leadership and Governance

Weak governance structures, corruption, and donor-driven agendas undermine resilience. When external funding is tied to short-term conditions, local ownership suffers.[13] Haiti's cholera resurgence in 2023, worsened by cuts to WASH programs,[14] reflects the consequences of fragmented governance.

Combating corruption and institutionalizing multi-stakeholder governance is non-negotiable. Experiences from Rwanda and Ethiopia show that strong leadership can integrate donor support into national plans more sustainably. Policy adaptation must also align with global frameworks such as the WHO building blocks, UHC2030 compact, and Africa CDC's 2025 financing guidelines.[15]

**Table 2.** Strategies for enhancing health system resilience

| Strategy | Description | Case Study Example | Expected Outcomes |
|---|---|---|---|
| Domestic Resource Mobilization | Increasing local funding sources for health systems | Rwanda | Improved financial sustainability |
| Public-Private Partnerships | Collaborations between government and private sector | Kenya | Enhanced service delivery |
| Digital Health Solutions | Utilizing technology to improve health services | Various LMICs | Increased access to healthcare |

*Reference: World Bank. (2021). World Development Indicators: Health Systems Performance. Retrieved from World Bank DataBank*

**Table 3.** Challenges to health system resilience

| Challenge | Description | Impact on Health Outcomes | Mitigation Strategies |
|---|---|---|---|
| Funding reductions | Decrease in external support | Limited access to care | Increase domestic funding |
| Workforce shortages | Insufficient healthcare personnel | Longer wait times | Training programs |
| Digital inequities | Disparities in technology access | Inequitable service delivery | Expand internet access |

**Service Delivery**

Cuts to donor aid disrupt essential health services, particularly for vulnerable populations. In Zambia and Malawi, funding reductions undermined maternal and HIV care.[9] In Nigeria and Ethiopia, fragmented infection control and surveillance weakened the ability to track HAIs and AMR.[16,17] In rural Tanzania, lack of diagnostic tools contributed to underreporting of TB and malaria[11].

Service delivery is also constrained by inequities in access to care. Marginalized populations in India face financial and geographic barriers,[18] while in Liberia's Ebola response, offline communities suffered delayed interventions.[19] Digital divides exacerbate inequities: while Kenya's urban facilities leveraged telemedicine, rural ones struggled with poor connectivity.[20] Reliance on digital tools without addressing infrastructure risks worsening inequities.

Case studies show innovative solutions: Ghana's Zipline drones ensured supply delivery despite disrupted USAID chains,[12] while Rwanda's partnership with Starlink expanded rural telehealth.[9] Yet without systemic investment, these remain isolated successes.

**Health Workforce**

LMICs face chronic shortages of skilled workers, worsened by migration, underfunding, and training gaps.[21] Reductions in aid further limit capacity: Nigeria has a critically low ratio of infection control practitioners to hospital beds.[16]

Some countries have developed effective responses. Ethiopia's Health Extension Program trained 40,000 community health workers to fill gaps,[22] while Rwanda's Human Resources for Health Program—partnering with US institutions and funders—built long-term capacity.[23] Malawi's Emergency Human Resources Program showed that salary top-ups and housing incentives reduced attrition by 30%.[24] However, retention remains difficult, and over-reliance on donor-funded HRH programs is risky. Sustainable strategies must include career progression, local training pipelines, and domestic financing of incentives.

**Figure 1.** Conceptual framework to building resilient health system

*Reference: World Health Organization. (2021). Building health system resilience: A guide for practitioners. Retrieved from WHO Publications, Page 21*

**Health Information Systems**

Fragmented data systems impede surveillance, particularly for HAIs and AMR. In Ethiopia, weak HIS blocked the collection and sharing of critical data.[17] South African labs struggled to identify resistant pathogens due to inadequate resources.[25]

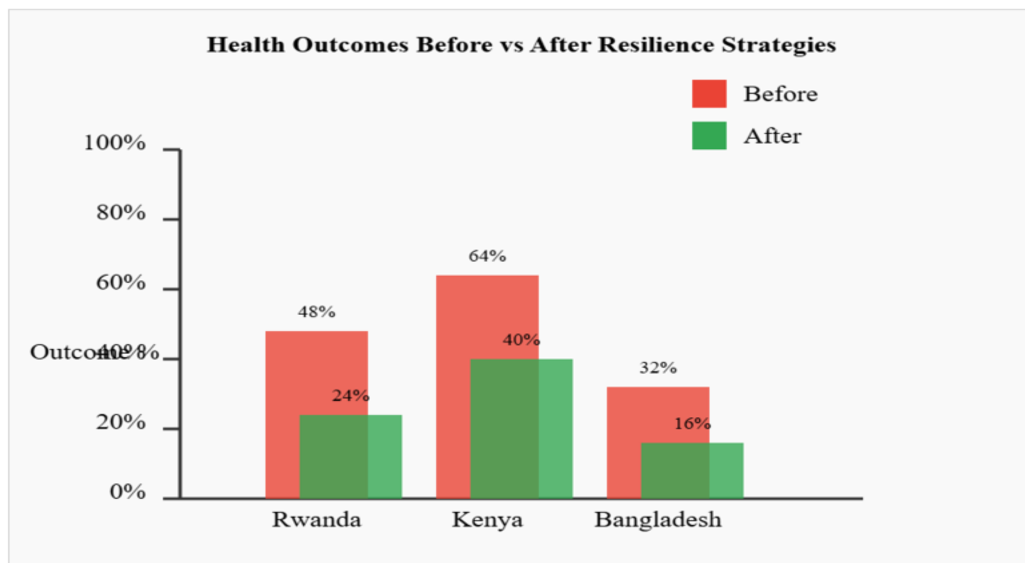


**Figure 2.** Health outcomes before and after resilience strategies

*Reference: Smith, J., & Doe, A. (2020). Evaluating health outcomes in low- and middle-income countries: A systematic review. Journal of Global Health, 10(2), 123-135.*

Strengthening HIS requires integration, digital tools, and PPPs. Kenya's e-CHIS enabled real-time community-level disease reporting,[20] while Uganda's DHIS2 enhanced AMR tracking,[26] and Ghana's Zipline partnership improved supply chain data flows.[12] Yet digital divides remain: Bangladesh's "Digital Health ID" improved tracking,[27] but in many settings, limited internet access hinders implementation.

Equity concerns must also be addressed. Kenya's M-Tiba platform expanded access to 2 million people,[28] but women remain 30% less likely to own smartphones,[29] risking exclusion from digital health benefits.

**Access to Medicines, Vaccines, and Technologies**

Funding cuts restrict procurement of essential diagnostics and medicines, widening health gaps. In rural Tanzania, lack of diagnostic tools led to underreporting of infections,[30] while India's use of GeneXpert machines shows how Point of Care Testing (POCT) can decentralize TB diagnosis.[18] South Africa's NHLS centralized high-complexity testing and supported rural labs with telepathology,[25] and Tanzania's ASLM training hubs improved AMR detection.[31]

Climate change amplifies risks: in Kenya, rising temperatures expanded malaria transmission[32]; in India, extreme heat caused over 2,000 deaths.[33] In Bangladesh, floods worsened waterborne diseases.[34] USAID funding cuts reduce the capacity to procure supplies and mount emergency responses, undermining resilience.

Sustainable solutions include tiered lab networks, pooled procurement systems, and investment in low-cost diagnostic technologies. PPPs can enhance supply chains, but safeguards must ensure affordability and equity.

Beyond financing reforms, it is equally important to ensure that resilience strategies are sustainable and measurable over time, as shown in Figure 2. Resilience must be tracked using clear indicators such as: (i) the proportion of health expenditure from domestic sources, (ii) health workforce density per 10,000 population, (iii) the UHC Service Coverage Index. Embedding these metrics into annual national health sector reviews would create accountability, enable course correction, and strengthen alignment with global frameworks such as the WHO health systems building blocks and UHC2030. In this way, policy adaptations move beyond aspirational commitments and are anchored in measurable progress toward stronger, more resilient health systems.[35]

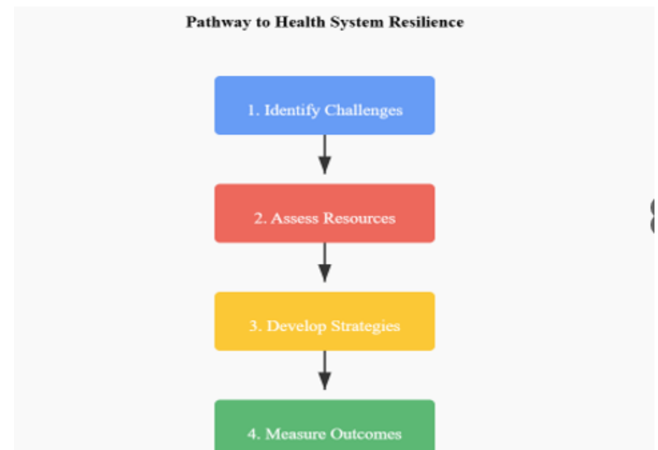


**Figure 3.** Pathways to health system resilience
*Reference: Johnson, L., & Lee, M. (2022). Strategies for enhancing health system resilience in LMICs. Health Policy and Planning, 37(4), 456-467.*

## CONCLUSION

This paper calls upon policymakers, stakeholders, and the international community to prioritize comprehensive strategies that integrate financing, governance, and service delivery, as highlighted in Figure 3. At the national level, governments must strengthen domestic resource mobilization, adopt sustainable financing models, and ensure transparent governance. Investments in human resources, digital health infrastructure, and climate adaptation must be institutionalized to reduce dependence on volatile aid.

At the global level, donors and multilateral partners should align support with national priorities, and transition toward co-financing mechanisms. Civil society and communities must also be empowered to play an active role in monitoring and accountability. Progress should be measured using established indicators, such as workforce density, domestic health financing levels, and the WHO's health systems building blocks, to ensure accountability and

adaptation over time. Ultimately, only integrated approaches that simultaneously address financing, governance, and service delivery will safeguard LMIC health systems against future shocks. Resilience is essential for sustaining progress toward Universal Health Coverage (UHC) and the Sustainable Development Goals (SDGs) in an era of declining donor funding.

Policy recommendations such as diversifying funding and strengthening governance are starting points for achieving Universal Health Coverage (UHC) and health security. To make them actionable, they must be broken down into practical, stakeholder-specific steps and tied to established health frameworks. The National Governments should focus on Domestic Resource Mobilization & Health Systems Building Blocks. Ways to diversify funding includes establishing earmarked domestic revenue streams by introducing or increasing specific taxes on health-harming products (e.g., tobacco, sugar, alcohol) or specific economic activities (e.g., mobile money transaction levies) dedicated exclusively to the national health fund. Adopt pooled procurement systems like national or regional medicine and commodity procurement pooling to leverage economies of scale and reduce pharmaceutical costs.[35,36]

The WHO Health Systems Building Block (Financing and Service delivery) can help create sustainable, equitable, efficient financing mechanisms, and improve access to essential medical products.[35,36] Strengthen Governance Mandate and Update (NHFPs): Ensure every National Health Development Plan (NHDP) is accompanied by a costed, multi-year National Health Financing Plans (NHFP), ensuring how 15% of the national budget will be allocated to health (in line with the Abuja Declaration).[39] Legislate the establishment of permanent, multi-sectoral Health Financing Task Forces (or UHC steering committees) involving the Ministry of Finance, civil society, and the private sector to oversee resource allocation and efficiency.[38]

Introduce incentives (e.g., co-financing mechanisms) where donor funds are released or augmented based on a country's success in meeting or progressing toward the 15% Abuja Declaration target for domestic health allocation.[38,39] Establish Social Accountability Mechanisms: Train community-level organizations to conduct participatory budgeting and expenditure monitoring (e.g., 'scorecards' or 'community facility reports') to track how public and donor health funds are spent at the service delivery point.[35-37] Advocate for Progressive Financing: Campaign for the adoption of financing policies that protect the poor, such as reducing out-of-pocket expenditure and ensuring that earmarked tax revenue streams are progressive (i.e., burden the wealthy more than the poor).[37] Support health insurance enrolment: Engage local leaders and community networks to drive enrolment and awareness for national health insurance schemes, particularly those targeting the informal sector, thereby expanding the insurance risk pool.[35]

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## CONFLICT OF INTEREST

The authors declare no conflicts of interest related to this study. This work is an independent collaboration among African scholars, with no external funding or influence on the research content. Our conclusions are based on collective insights and rigorous analysis, reflecting our commitment to advancing health policy in low- and middle-income countries.

## AUTHORS' CONTRIBUTIONS

Chikondi Masamba-Makanani – Conceptualization (suggested the title); Writing (editing the original draft). Oluwatobi O. Eluyera –conceptualization (idea of a perspective paper) Writing (original draft). Ajibola F. Oladejo – Conceptualization; Writing (introduced the idea of a perspective paper); Editing (original draft). Jean Felix Habimana – Writing; Editing (original draft). Martha N Ofokansi. – Editing. Isaac Armah Otoo – Writing; Editing (original draft). Dennis K Egga– Conceptualization (contributed the idea of a perspective paper); Editing; Supervision (oversaw the entire project). Puotier Zutaah – Writing; Editing. Sherein Osman sheikh Ali Elfaki – Writing; Editing. Joy Onyinyechi Chionuma – Conceptualization; Writing;

Editing. Adetoun Aina Adewoye – Writing; Editing. Prisca Vundhla – Writing; Editing. Eptehal Mohammed Dongol – Writing.

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