MEDTRONIC LABS

TRANSFORMING HYPERTENSION AND DIABETES CARE IN TANZANIA

CLOSING THE CARE CASCADE WITH DIGITAL TECHNOLOGY

THE AFYA IMARA (GOOD HEALTH) PROGRAM

Table of Contents

EXECUTIVE SUMMARY 01

THE CHALLENGE: TANZANIA'S HIDDEN HEALTH CRISIS 02

REIMAGINING NCD CARE DELIVERY WITH THE AFYA IMARA PROGRAM 03

PROGRAM RESULTS 05

DISCUSSION AND IMPLICATIONS 08

CONCLUSION: A MODEL FOR NCD CONTROL IN AFRICA 10

ACKNOWLEDGEMENTS 11

REFERENCES 12

EXECUTIVE SUMMARY

Like many African countries, Tanzania is facing a mounting crisis of non-communicable diseases (NCDs), with one in three adults suffering from hypertension, yet only 7% achieving control. The Afya Imara (Swahili for Good Health) program was designed to address this challenge through a multi-component model combining digital technology, community engagement, and targeted health system capacity enhancement. This constituted training over 200 healthcare providers and community health workers, equipping facilities with diagnostic tools, and establishing data-driven quality improvement initiatives across 21 faith-based facilities in four regions.

This paper describes the implementation strategy and presents comprehensive findings from the Afya Imara program, including 2 years of implementation (February 2022 - January 2024) and 1-year post-program follow-up data collected through January 2025. The evaluation demonstrates both immediate program impacts and the sustainability of clinical improvements one year after intensive program support concluded.

The program supported the screening of 75,981 individuals and enrolment of 19,639 patients into digitally enabled care. Among 15,672 patients with hypertension, 63% had documented blood pressure (BP) at 6 months, 43% at 12 months, and 34% at both time-points. Among 6,841 patients with diabetes, 47% had documented blood glucose at 6 months, 35% at 12 months, and 27% at both time points. Among patients with both 6 and 12-month documented readings, hypertension control rates improved from 18% at enrolment to 57% at 12 months, and diabetes control increased from 25% at baseline to 76% at 12 months.

Key success factors included the SPICE digital platform that streamlined care delivery, trained community health workers equipped with point-of-care screening tools and digital devices who bridged facility-community gaps, and data-driven management that enabled continuous improvement. While challenges remain, particularly in continuity of care, the program provides a scalable model for addressing Africa's NCD burden.

THE CHALLENGE: TANZANIA'S HIDDEN HEALTH CRISIS

The epidemiological landscape of Tanzania has transformed dramatically over the past two decades. What was once a country primarily battling infectious diseases now faces a dual burden, with NCDs—particularly cardiovascular diseases—emerging as major causes of death and disability, accounting for approximately 35% of all deaths, up from 23% in 1990.[1] This rapid transition meant that health systems designed for acute, episodic care found themselves ill-equipped to manage long-term chronic non-communicable conditions.[2,3]

The estimated age-standardized prevalence of hypertension among adults aged 30-79 years (2019) is 33%. More alarming is the cascade of missed opportunities: only 34% among these are diagnosed, less than a quarter (15%) are treated, and a mere 7% achieving control.[4] While nearly 1 in every 10 adults (9.8%) are living with diabetes, only 40% are aware of their status, suggesting millions of undiagnosed individuals unknowingly at risk of severe complications.[5]

The consequences are severe: 65% of cardiovascular-related deaths in the country are attributed to elevated systolic blood pressure.[4]

65% of cardiovascular-related deaths in Tanzania are attributable to elevated systolic blood pressure

Despite opportunistic community and facility-level screening efforts, significant gaps remain along the care cascade, particularly in linkage to care, long-term follow-up, and clinical management.[6]

REIMAGINING NCD CARE DELIVERY WITH THE AFYA IMARA PROGRAM

The Afya Imara program emerged from recognition that addressing Tanzania's NCD crisis required a comprehensive, multi-component approach across the care continuum from screening and early diagnosis to early optimized care and long-term, longitudinal management. The program focused on hypertension and diabetes, given their leading contribution to cardiovascular morbidity and mortality, as well as their shared lifestyle risk factors. The Program was implemented in 4 regions i.e., Arusha, Kilimanjaro, Dar es Salaam and Morogoro spanning both rural and urban settings. It was deployed in 21 faith-based facilities under the umbrella of the Christian Social Services Commission (CSSC).

Digital innovation at the core

The SPICE platform served as the program's technological backbone, revolutionizing how NCD services were delivered and monitored. The platform's design reflected deep understanding of frontline realities. User interfaces prioritized simplicity, recognizing healthcare workers' immense workloads and diverse digital fluency. Offline capabilities facilitated continued service delivery despite connectivity challenges, while clinical decision support functionalities guided providers through standardized protocols. This standardization enhanced quality of care while reducing cognitive burden on health workers.

Community-centred approach

Recognizing the asymptomatic nature of NCDs and the fact that many high-risk individuals rarely visited health facilities, the program invested heavily in community outreach. Screening campaigns brought services to households, markets, churches, and community centres. These events served dual purposes: raising NCD awareness and identifying new cases. Community health workers (CHWs) served as a critical link between health facilities and communities. Equipped with point-of-care screening tools such as digital blood pressure (BP) machines and glucometers, alongside smartphones running the SPICE application, CHWs conducted screening directly in their villages, captured data in real time, and seamlessly referred those with elevated values for further clinical evaluation. This combination of basic equipment and digital devices transformed CHWs from health messengers into empowered care providers, capable of basic risk assessment and patient support. The approach proved particularly useful for elderly patients and those with mobility challenges.

Decentralizing care and streamlining referral pathways

The strategic mix of program facilities across levels of care, including 6 health centres providing basic care, 11 district hospitals offering intermediate services, and 4 regional hospitals providing specialized services closed the referral loop while maintaining strong primary healthcare (PHC) foundations. Health centres and district-level hospitals served as crucial entry points, as they were more accessible and less intimidating for community members than larger hospitals. This tiered approach allowed patients to receive care at the appropriate level and facilitated seamless referrals for complex cases.

Strengthening health system capacity

Human resource development formed a cornerstone of implementation. The program trained over 200 healthcare workers and CHWs through comprehensive modules covering clinical NCD management according to Tanzania's national guidelines, digital platform proficiency, patient counselling techniques, and data interpretation skills. Health facilities received vital equipment such as BP monitors, glucometers, and tablets for digital-enabled service delivery, addressing basic infrastructure gaps that often hindered quality care.

Regular site visits ranging from 1-2 per facility per month depending on their performance provided ongoing support, with program staff conducting chart reviews, observing consultations, and addressing facility-specific challenges in real-time. This intense site-support model was meant to facilitate translation of new knowledge and skills into changed practice.

The program drove a data-driven culture through monthly review forums where site staff analysed key metrics such as screening, enrolments, follow-up rates and clinical outcomes. These sessions also served as peer learning opportunities. Real-time dashboards translated complex data into easy to access and interpret information, enabling rapid identification of issues and targeted interventions. This continuous learning approach drove steady program improvement throughout implementation.

PROGRAM RESULTS

Screening, linkage to care and enrolment

By January 2025, 75,981 individuals had been screened for hypertension across four Tanzanian regions, with 71,960 (95%) of them also receiving blood glucose tests. Screening identified 24,322 people (32%) with elevated blood pressure (BP ≥140/90mmHg) and 10,757 (15%) with elevated blood glucose (fasting blood glucose ≥7mmol/L/random blood glucose ≥11.1mmol/L). In total, 30,158 persons with elevated values were referred for further evaluation, 48% (14,519) of whom linked to diagnosis and care.

In addition to this population enrolled from screening, 5,120 known patients were directly enrolled during their routine clinical appointments, bringing the total enrolled population to 19,639. The distribution of their diagnosis is shown in Figure 1 below.

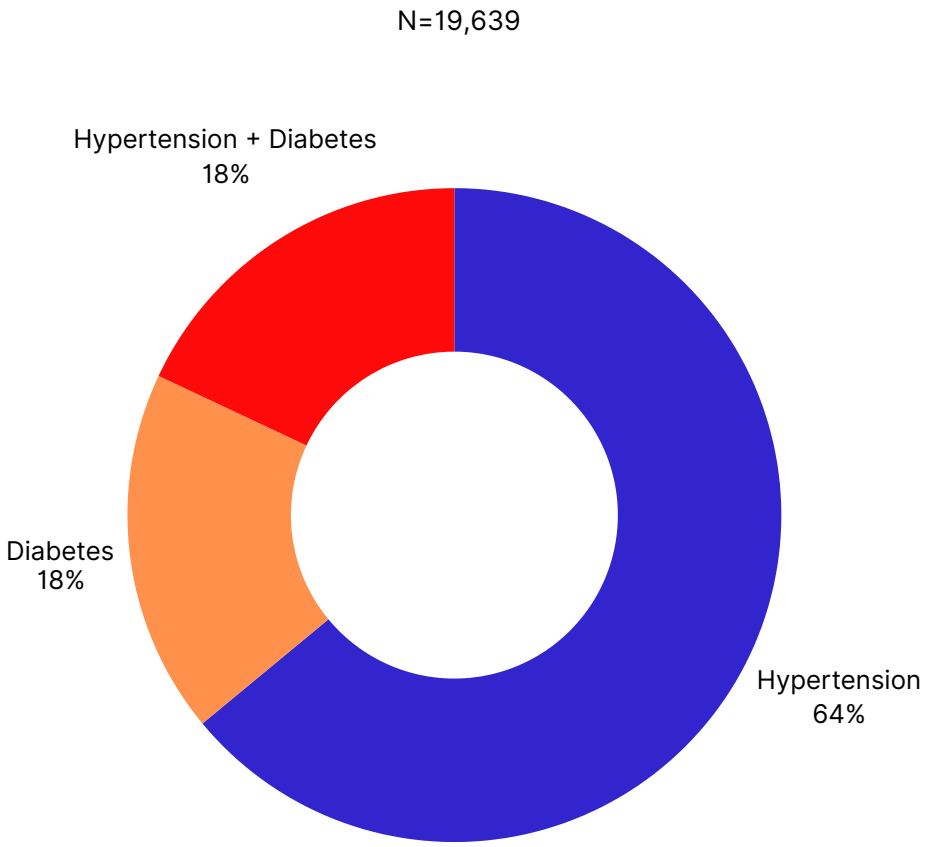

Figure 1: Diagnosis among patients enrolled in the Afya Imara program

Follow up care and clinical outcomes

Patient-level outcomes were assessed at baseline (enrolment), 6 months, and 12 months post-enrolment. Due to rolling enrolment, patients enrolled early in the program completed their 12-month follow-up during active program implementation (2023), while those enrolled later had their 12-month assessments extend beyond the active program period.

12-month cohort follow up analysis

A third of patients had repeated 6- and 12-month readings, with diabetes follow up being slightly less (27%) compared to hypertension (Figure 2). Anecdotal implementation insights into the lower diabetes follow up point towards more costly, less accessible and invasive testing required for blood glucose monitoring.

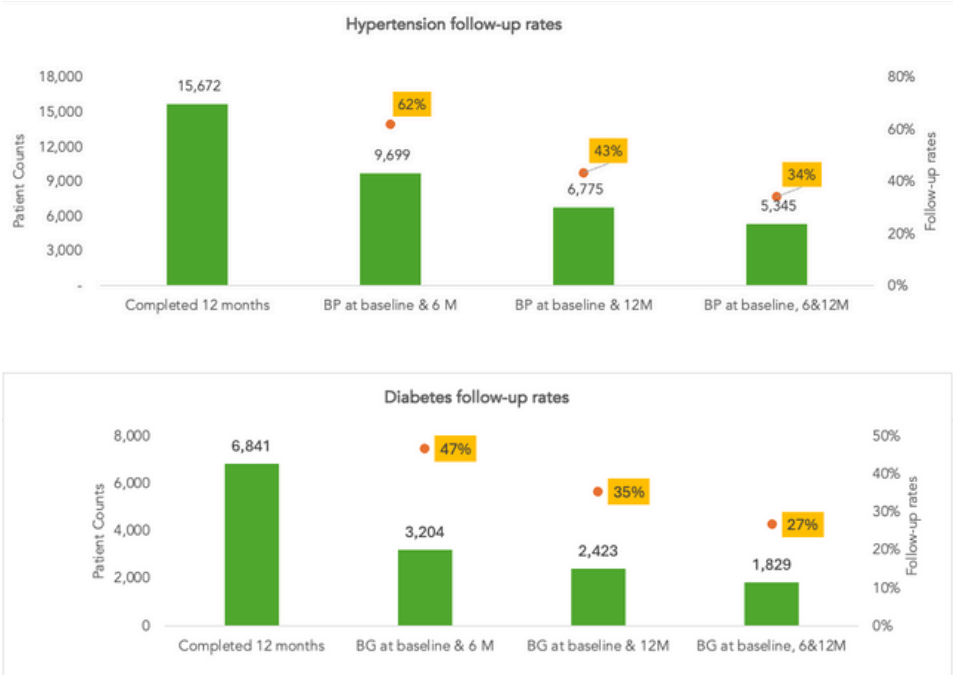

Figure 2: Six-and-twelve-month follow-up rates

Clinical outcomes

Blood pressure control improved significantly among patients with hypertension who had documented follow up readings, increasing from 18% at enrolment to 57% at 12 months ($p < 0.001$). Among the cohort who were enrolled with uncontrolled hypertension (BP ≥140/90mmHg; n=4,368), 48% achieved control at six months, rising to 56% by twelve months. Close to three-quarters of them (74%) experienced a >10 mmHg systolic BP reduction over the 12 months, a change associated with 20% reduced risk of major cardiovascular events.

The number of patients with the most severe grade of hypertension (BP ≥180/110mmHg) reduced by 87%, while those with grade 2 (BP: 160-179mmHg/100-109mmHg) and grade 1 (140-159/90-99mmHg) ranges reduced by 76% and 16% respectively (Figure 3).

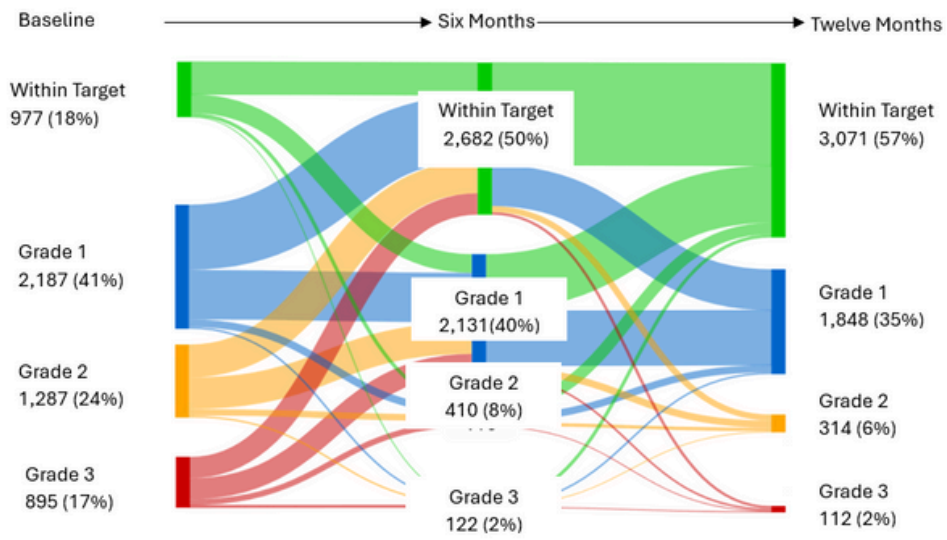

Figure 3: Shifts in hypertension severity

Similar to hypertension, glycaemic control (HbA1c ≤7%/fasting plasma glucose ≤7 mmol/L/post-prandial blood glucose ≤9 mmol/L) among patients with both six- and twelve-month follow-up records markedly improved (Figure 4), tripling from 25% at enrolment to 76% at 12 months (p<0.001).

Among patients enrolled into the program with uncontrolled blood glucose (n=1,365), 65% achieved control at six months, improving to 71% at 12 months.

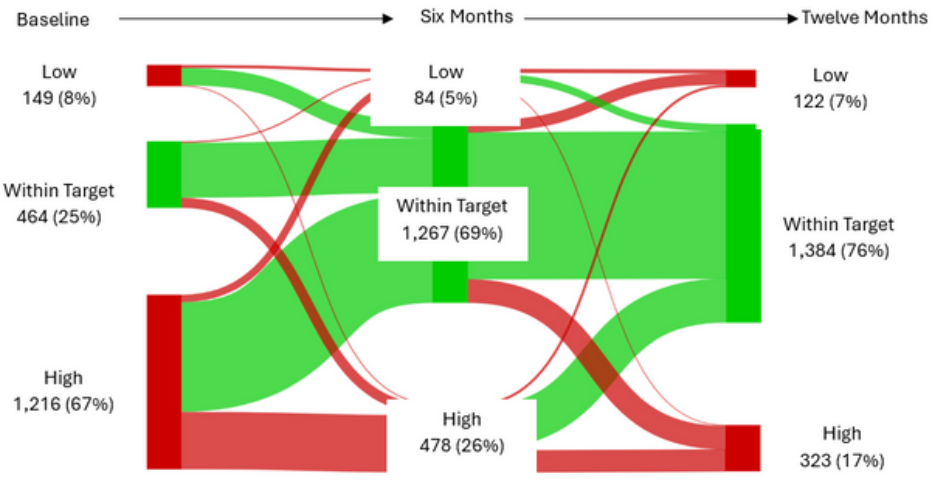

Figure 4: Shifts in glycaemic control

DISCUSSION AND IMPLICATIONS

The Afya Imara program established itself as a strong model for systematic community-based screening and early detection of hypertension and diabetes in Tanzania, reaching nearly 76,000 individuals across four regions by January 2025. The identified prevalence of elevated BP (32%) and blood glucose (15%) mirrors national estimates, underscoring the vital role of community-based screening in early detection.

The fact that less than half (48%) of those referred linked to diagnosis and care shows a well-documented challenge in sub-Saharan Africa, where referral-to-care completion often remains low due to distance to facilities, indirect costs, long wait times, and inadequate patient tracking.[8] Our linkage-to-care and 6/12 month follow-up findings might however be explained by the fact that while screening was population based, the program was implemented exclusively in faith-based facilities. Some individuals may have chosen to attend facilities not supported by the program post-screening or post initial enrolment, particularly public facilities which may be preferred due to cost considerations and thus affecting the program's reported follow-up rates.[9]

Among patients with consistently documented follow-up, disease management outcomes showed clear improvement, with control rates nearly tripling from baseline to 12 months. While these superior outcomes may partly reflect survivor bias/selection effects, they also demonstrate that consistent monitoring is a critical component towards achieving disease control.

The integration of the SPICE platform represented a fundamental transformation in NCD service delivery across the 21 participating facilities. It enabled real-time and seamless patient tracking across the care continuum and helped uncover and quantify real-world challenges in continuity of care. Adoption of the platform was however not automatic. Initial scepticism from users necessitated substantial change management initiatives, including intense training and re-training, frequent site support visits and demonstration of potential benefits such as improved patient monitoring and ease of record retrieval. Despite these efforts, ensuring consistent platform use across all sites remained challenging, especially in sites with high staff turnover or limited digital literacy, which may have further contributed to the observed low follow-up rates. Patients might have actually been followed up, but off SPICE, highlighting a potential limitation in a single form of data capture.

Program strengths and limitations

The program's strengths lie in its robust, end-to-end digital integration, and measurable clinical gains among retained patients. The strategic mix of participating sites facilitated referral pathways while maintaining strong primary healthcare foundations.

However, we also do acknowledge several critical limitations. The exclusive implementation in faith-based facilities may have limited longitudinal tracking for patients who prefer public facilities due to cost or other factors. Future implementations should consider cross-sector coordination and integrated referral pathways that acknowledge individual agency in facility choice. Further, mixed methods evaluations that capture the experiences of those who disengage from care or whose data is not documented should be prioritized. Understanding patient disengagement is as crucial as celebrating the successes of those with follow-up.

The demonstrated feasibility of achieving the observed control rates in resource-limited settings—even if only among patients with documented readings—provides proof that quality NCD care is achievable in Tanzania and similar settings. The challenge now is to extend this success to the broader population, including those who face the greatest barriers to consistent follow up. This will require not just technical solutions but fundamental health system strengthening, including sustainable financing mechanisms, workforce development, and integration with existing programs such as HIV care that have successfully demonstrated chronic disease care at scale.

Going Forward - Scaling Impact

Building Sustainability

Financial sustainability remains critical for long-term impact. While philanthropic financing catalysed Afya Imara, the program's demonstrated clinical benefits provide strong arguments for integration into domestic financing, official development assistance and even social insurance schemes.

Scaling should be conducted strategically, prioritizing high-burden regions with implementation readiness. The model's proven adaptability across urban and rural contexts provides confidence, but each new area requires careful assessment of health system capacity, partner landscapes, cultural adaptation and local context. Creating learning networks among implementing facilities could accelerate quality improvement and innovation spread.

Technology and Innovation

Future technological enhancements could further improve efficiency and impact. Direct patient-facing interventions such as SMS, USSD or mobile applications for self-monitoring and education could extend the program's reach and further strengthen patient engagement. Artificial intelligence could optimize treatment protocols, create targeted patient education content and predict patients at risk of disengagement. Integration with national health information systems would ensure continuity as patients move between facilities.

However, technology must remain a tool for enhancing human connection, not replacing it. The program's success came from empowering healthcare workers and communities with digital tools, not from mere automation. This human-centered approach to digital health provides a model for technology deployment across African health systems.

CONCLUSION: A MODEL FOR NCD CONTROL IN AFRICA

The Afya Imara program has demonstrated that transformative improvements in NCD care are achievable in resource-limited settings. Beyond clinical outcomes, it established a replicable model for reimagining healthcare delivery in the digital age.

The program's true innovation lay not in any single component but in thoughtful integration of digital tools, community engagement, and health system strengthening around patient needs. This holistic approach, combined with commitment to data-driven continuous improvement, created sustainable change.

As Tanzania and other African countries tackle the dual burden of infectious and non-communicable diseases, the Afya Imara model lights a path forward. The thousands of patients now living with controlled blood pressure and glucose levels stand as proof that quality chronic disease care need not remain the privilege of wealthy nations.

The journey toward universal health coverage must include comprehensive NCD services as a central pillar. With appropriate innovation, investment, and commitment, African countries can lead in demonstrating models of care that leverage technology while remaining grounded in community needs. The Afya Imara program has shown what's possible, now it is time to scale these successes to reach the millions still waiting for the care they deserve.

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