MEDTRONIC **LABS**

INTEGRATING HYPERTENSION AND DIABETES INTO PRIMARY HEALTH CARE IN KENYA

A CASE FOR DECENTRALIZING NCD SERVICES

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EXECUTIVE SUMMARY

Non-communicable diseases (NCDs), particularly hypertension and diabetes, contribute significantly to morbidity and mortality in Kenya. Historically, these services have been concentrated at sub-county and county referral hospitals, limiting access for rural and underserved populations. This case study makes the case for decentralization of NCD services to lower-tier primary health care (PHC) facilities, supported by digital innovations, structured supervision, and task-shifting models. We draw on programmatic experience and outcomes from the Empower Health Program (2019–2025), which reached 245 facilities across 18 counties, enrolled over 89,363 patients, and demonstrated that with adequate support, dispensaries and health centers (67% of all program sites; managing 28% of the enrolled patients) can deliver high-quality hypertension and diabetes care.

Among patients with hypertension, consistent follow-up rates at 6 and 12 months were higher at health centres and dispensaries (34%) than at sub-county hospitals (22%) and county referral hospitals (28%) ($p<0.001$). They also achieved greater systolic blood pressure (BP) reductions (12.9 mmHg) versus sub-county hospitals (6.4 mmHg) and county referral hospitals (4.4 mmHg) ($p<0.001$). Among patients with 6 & 12 month BP data, control rates (<140/90mmHg) improved from 37% to 56% (+19 percentage points), with dispensaries and health centres showing the greatest gains (+31 percentage points), followed by sub-county hospitals (+16 percentage points) and county referral hospitals (+5 percentage points).

For diabetes, glycaemic control improved modestly, increasing from 44% to 50% at six months ($p<0.001$) then dropping to 48% at twelve months ($p=0.139$), with all three facility types showing similar improvements (4-5 percentage points) over the 12 months. The marginal improvement is likely due to absence of structured lifestyle interventions and challenges of medication availability observed during micro stock status activities carried out during implementation. County referral hospitals achieved better consistent follow-up (42%) compared to health centres/dispensaries (23%) and sub-county hospitals (17%), reflecting resource disparities for glucose monitoring.

While concerns about quality at PHC facilities have been raised, citing training gaps, equipment shortages, and weak laboratory infrastructure, this programmatic experience demonstrates that properly supported decentralization achieves the opposite. Dispensaries and health centres equipped with digital tools, training, mentorship, and basic equipment achieved clinical outcomes matching or exceeding hospitals, with better continuity of care and improved control rates. However, with only one-quarter of patients maintaining consistent follow-up, retention emerges as the most critical challenge requiring investigation and targeted interventions. For patients who remain in care, achieving optimal outcomes demands strengthened supply chains and structured lifestyle programs to complement medical management.

BACKGROUND

Kenya's health system comprises six levels, from community health services (Level 1) through national referral hospitals (Level 6).[1] Sub- County (district-level) hospitals and above (Levels 4-6) constitute less than 10% of public health facilities[2] yet have historically been the dominant providers of Non-Communicable Disease (NCD) services, requiring most patients to travel long distances for care. This centralized approach is increasingly untenable as Kenya faces a growing NCD epidemic: hypertension prevalence has reached 24% among adults,[3] diabetes affects 3.1% of the population,[4] and NCDs now account for 39% of all deaths, up from 27% in 2014.[5]

The 90% of health facilities that are dispensaries and health centres (Level 2-3)—located within walking distance of most communities—have traditionally not had adequate capacity to offer NCD services,[6,7] creating a fundamental mismatch between disease burden and service availability.

NCDs now account for 39% of all deaths, up from 27% in 2014.

The Case for Decentralization

The Kenya National NCD Strategic Plan 2021/22-2025/26 explicitly calls for strengthening primary health care as the cornerstone of NCD management, targeting 85% of Level 2-3 facilities to provide integrated NCD services by 2025.[5]

Kenya's Primary Care Network guidelines provide the institutional framework for operationalizing this decentralization, establishing a hub-and-spoke model with sub-county hospitals supporting dispensaries, health centres, and community units.[8]

This aligns with global evidence supporting task-shifting and task-sharing as critical strategies for expanding NCD coverage in resource-constrained settings. The WHO Package of Essential NCD (PEN) interventions provides protocols enabling non-physician health workers to deliver quality NCD care at primary settings,[9] while Adejumo et al. demonstrate that task-sharing for hypertension management in Africa can be effectively delivered without compromising outcomes.[10]

Integration for Multimorbidity

In Kenya, patients with both comorbid hypertension and diabetes represent a significant proportion of the NCD burden.[11,12] For these patients, traveling to distant hospitals for separate clinical visits creates significant hardship, particularly in resource-limited settings. Integration of services into a one-stop shop model at PHC level reduces fragmentation, lowers transport costs, and enhances continuity of care. Integrated service delivery models—where services for multiple conditions are offered during single visits—have been shown to improve outcomes while reducing patient burden.[13,14]

Addressing Quality Concerns

Concerns have been raised about decentralizing NCD care to PHC facilities with attendant task shifting/sharing, citing potential quality risks and inadequate capacity.[15,16] Facility assessments in Kenya revealed that only 24% of health facilities are ready to offer integrated cardiovascular disease and diabetes care, with primary facilities significantly less prepared than hospitals.[7] However, these quality concerns can be effectively mitigated when decentralization is accompanied by appropriate support systems— decision support tools, reliable supply chains, point-of-care diagnostics, and structured mentorship.[15,17]

The Empower Health program was designed to demonstrate that proper implementation of decentralization, with one-stop shops for comorbid patients, digital support systems, and continuous capacity building can address both access and quality challenges simultaneously.

PROGRAM IMPLEMENTATION

The Empower Health Program has been implemented since July 2019 through partnerships between the Ministry of Health, Medtronic Labs, and County Governments across 245 facilities in 18 counties: 57 dispensaries, 107 health centres, 69 sub-county hospitals, and 12 county referral hospitals.

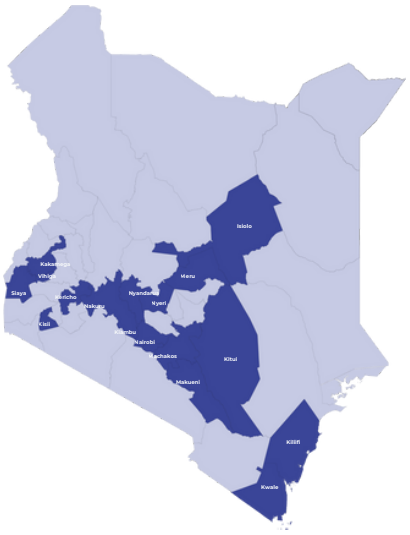

Figure 1.Distribution of program implementation counties

Program Implementation Sites

- 18 Counties Implementing
- 57 Dispensaries
- 107 Health Centres
- 69 Sub-County Hospitals
- 12 County referral Hospitals

Comprehensive Decentralization Strategy

The program's core strategy involved shifting NCD services from the traditional concentration at sub-county hospitals to lower-tier facilities closer to communities. This decentralization aimed to transform dispensaries and health centres, previously considered inadequate for chronic disease management, into functional NCD care points. The approach recognized that uncomplicated hypertension and diabetes, representing the majority of patients, could be effectively managed at primary care level when provided with appropriate support.

Service Integration: Given the limited human resources and infrastructure at lower-tier facilities, coupled with 20% of patients having both hypertension and diabetes, the program implemented integrated "one-stop shop" clinics. Rather than creating separate vertical programs that would strain limited resources, patients received comprehensive care for both conditions during single visits. This integration was essential for making decentralization feasible—facilities could not support multiple disease-specific clinics with their constrained staffing.

Capacity Building for Task-Sharing: Decentralization required fundamental shifts in who could provide NCD care. Health workers at dispensaries and health centres, who had minimal prior NCD experience, received structured training on Ministry of Health guidelines. Training covered screening, diagnosis confirmation, treatment initiation and adjustment for uncomplicated cases, and identification of complications requiring referral.

Digital Tools as Enablers: The SPICE platform made decentralization possible by providing clinical decision support that empowered health workers at these facilities to make evidence-based decisions. The platform's algorithms guided structured patient management, calculated cardiovascular risk, gave reminder notifications for tests and provided treatment intensification nudges.

Equipment and Commodity Redistribution: Decentralization required ensuring lower-tier facilities had basic diagnostic equipment and medications. The program supplemented facilities with blood pressure machines, glucometers, and anthropometric measurement tools. For medications, the program used SPICE platform data to facilitate quantification and support redistribution of essential medicines from higher to lower facilities, addressing the historical concentration of resources at hospitals. The digital platform's real-time patient enrolment and visit data enabled reliable demand forecasting, ensuring redistribution matched actual patient loads rather than historical estimates.

Community Screening and Linkage: Household and community camp screening reached over 300,000 people. Individuals with elevated readings were referred to nearby PHCs rather than distant hospitals, making the decentralized model function.

Structured Clinic Operations: To make decentralization work with limited staff, facilities established weekly or bi-weekly NCD clinics with standardized patient flow: health education sessions, vital signs measurement, integrated consultation, laboratory services where available, and coordinated pharmacy services. This structured approach maximized efficiency with minimal resources.

Referral Pathways: Clear protocols derived from MoH Guidelines defined which cases PHCs could manage and which required hospital care. This ensured decentralization didn't compromise safety for complex cases.

Continuous Support Systems: Recognizing that decentralization couldn't succeed through one-time training alone, the program established ongoing support through support supervision and mentorship visits by County and sub-county health leadership and family physician networks, and regular data review meetings for performance monitoring and problem-solving.

KEY FINDINGS

Patient Enrolment and Distribution:

The program enrolled 89,363 patients: 67% with hypertension, 13% with diabetes, and 20% with both conditions. While 32% of hypertension patients were managed at dispensaries and health centres, only 19% of diabetes patients received care at this level, indicating persistent centralization of diabetes services. Table 1 shows distribution of patients enrolled by condition across the levels of care.

	Dispensaries/Health centres	Sub-county hospitals	County referral hospitals	Total
Hypertension	19,197 (76%)	33,377 (66%)	7,472 (55%)	60,046 (67%)
Diabetes	2,279 (9%)	6,949 (14%)	2,506 (19%)	11,734 (13%)
Hypertension + Diabetes	3,624 (15%)	10,496 (20%)	3,463 (26%)	17,583 (20%
Total	25,100	50,822	13,441	89,363

Hypertension

Among 65,517 patients with hypertension enrolled for ≥12 months, only 26% had blood pressure documented at both 6 and 12 months consistently. However, significant variations emerged across facility types: dispensaries and health centres achieved the highest consistent follow-up rates at 34% (both 6 and 12 months), compared to only 22% at sub-county hospitals and 28% at county referral hospitals($p<0.001$). This pattern suggests that proximity to care outweighs facility sophistication for maintaining patients in care (Figure 2).

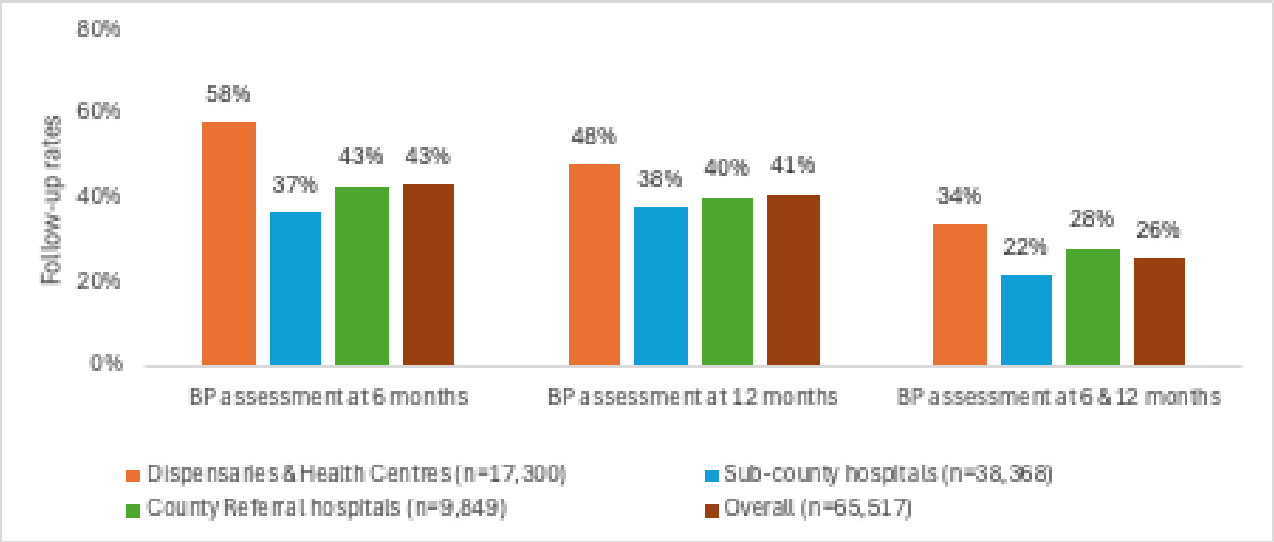

Figure 2. Hypertension Follow up rates.

For patients with documented 6 &12 month follow-up (n=16,970), overall control rates (<140/90 mmHg) improved from 37% at baseline to 56% at 12 months ($p<0.001$), with progressive reduction in patients with more severe forms of hypertension. For instance, the proportion of patients with the most severe form (Grade 3) reduced by 54% (Figure 3).

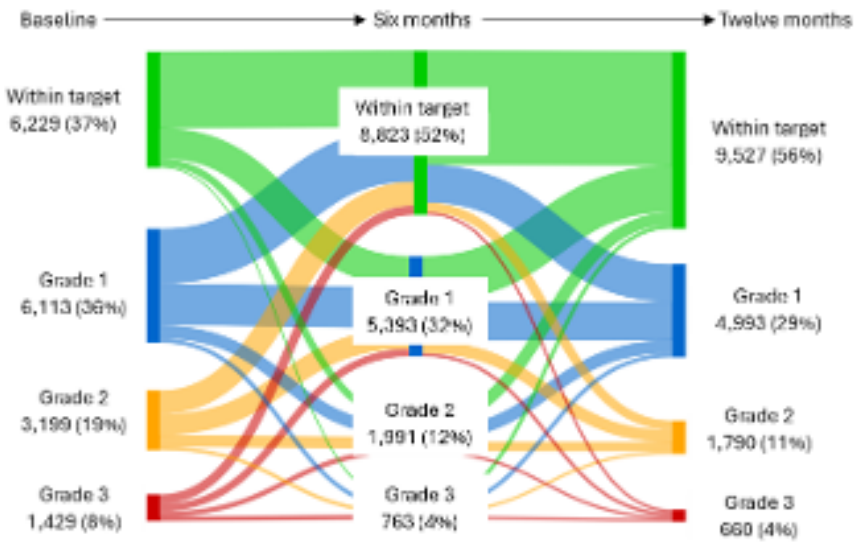

Figure 3 Overall changes in hypertension severity

The improvements varied substantially by facility type (Figure 4): dispensaries and health centres showed the greatest gains with control rates increasing by 31 percentage points (from 32% to 63%), sub-county hospitals improved by 16 percentage points (from 37% to 53%), while county referral hospitals showed minimal improvement of 5 percentage points (from 46% to 51%)(p<0.001).

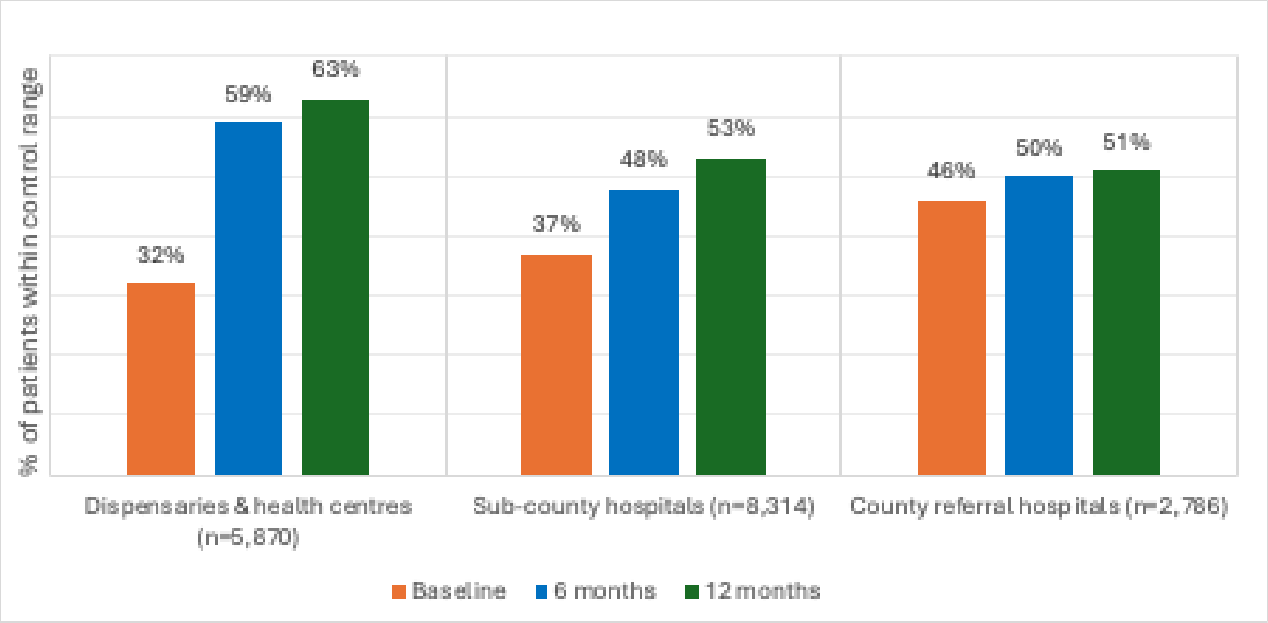

Figure 4 Longitudinal changes in control rates by facility type

Patients at dispensaries and health centres experienced mean systolic blood pressure reductions of 12.9 mmHg and diastolic reductions of 5.9 mmHg, approximately double the reductions observed at sub-county hospitals (6.4/3.2 mmHg) and nearly triple those at county referral hospitals (4.4/0.6 mmHg) as shown in Table 2 below.

	Systolic BP (mmHg) Mean (SD)			**Diastolic BP (mmHg)** Mean (SD)		
	Dispensaries & Health centres	**Sub-county hospitals**	**County Referral Hospitals**	**Dispensaries & Health centres**	**Sub-county hospitals**	**County Referral Hospitals**
Baseline	147.8 (21.5)	145.4 (22.0)	140.9 (22.0)	85.6 (12.9)	83.7 (12.8)	82.8 (12.6)
6 months	136.2 (18.0) Δ -11.2	141.2 (20.7) Δ -4.2	138.6 (21.1) Δ -2.3	80.3 (11.4) Δ -5.3	81.3 (11.7) Δ -2.4	81.7 (12.5) Δ -1.1
12 months	134.9 (17.5) Δ -12.9	139.0 (20.1) Δ -6.4	136.5 (21.2) Δ -4.4	79.7 (11.0) Δ -5.9	80.5 (11.5) Δ -3.2	82.2 (12.2) Δ -0.6

Δ: BP changes from baseline

Diabetes

Among 25,190 diabetes patients enrolled for ≥12 months, only 23% had blood glucose documented consistently at both 6 and 12 months. The pattern differed from hypertension: county referral hospitals achieved the highest consistent follow-up at 42%, while dispensaries and health centres managed 23%, and sub-county hospitals 17% (p<0.001) as shown in Figure 5 . This inverse pattern likely reflects the greater resource requirements for diabetes monitoring, including glucose testing supplies more available at high-level facilities.

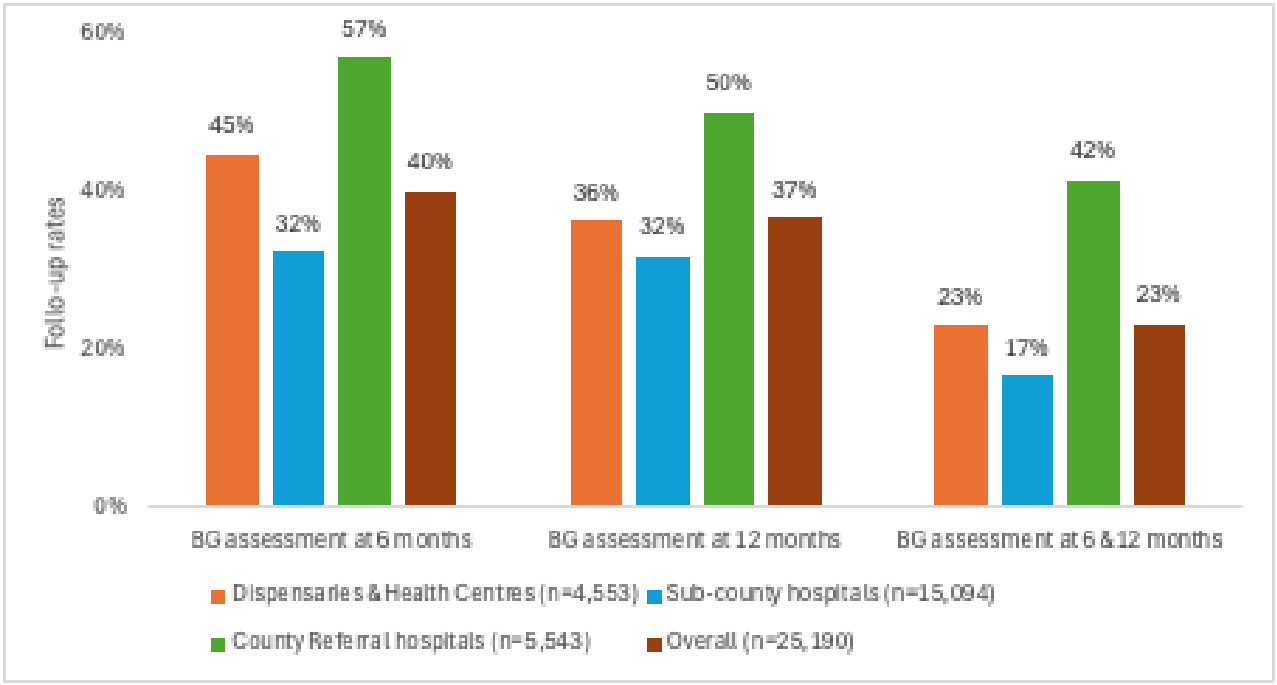

Figure 5 Proportion of patients with documented blood glucose

Glycaemic control improved (Figure 6) from 44% to 48% at 12 months (p<0.001) with minimal variation across facility types: 5 percentage point improvement at dispensaries and health centres, 4 percentage points at both sub-county hospitals and county referral hospitals (Figure 7).

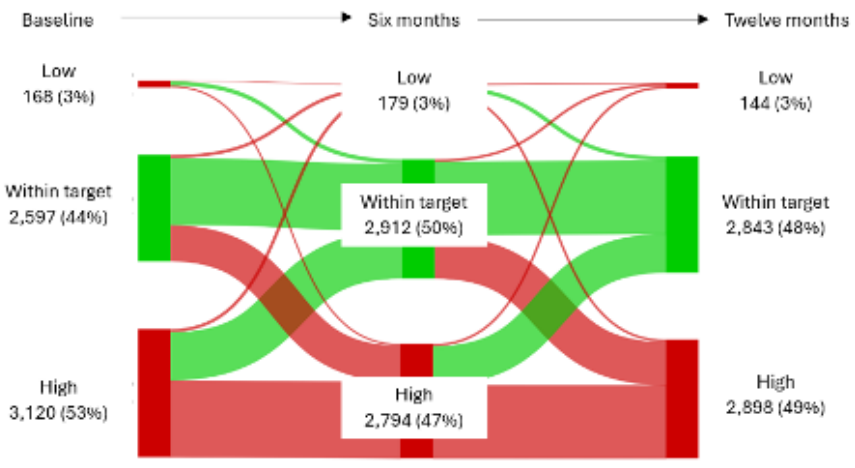

Figure 6 Overall changes in glycemic control

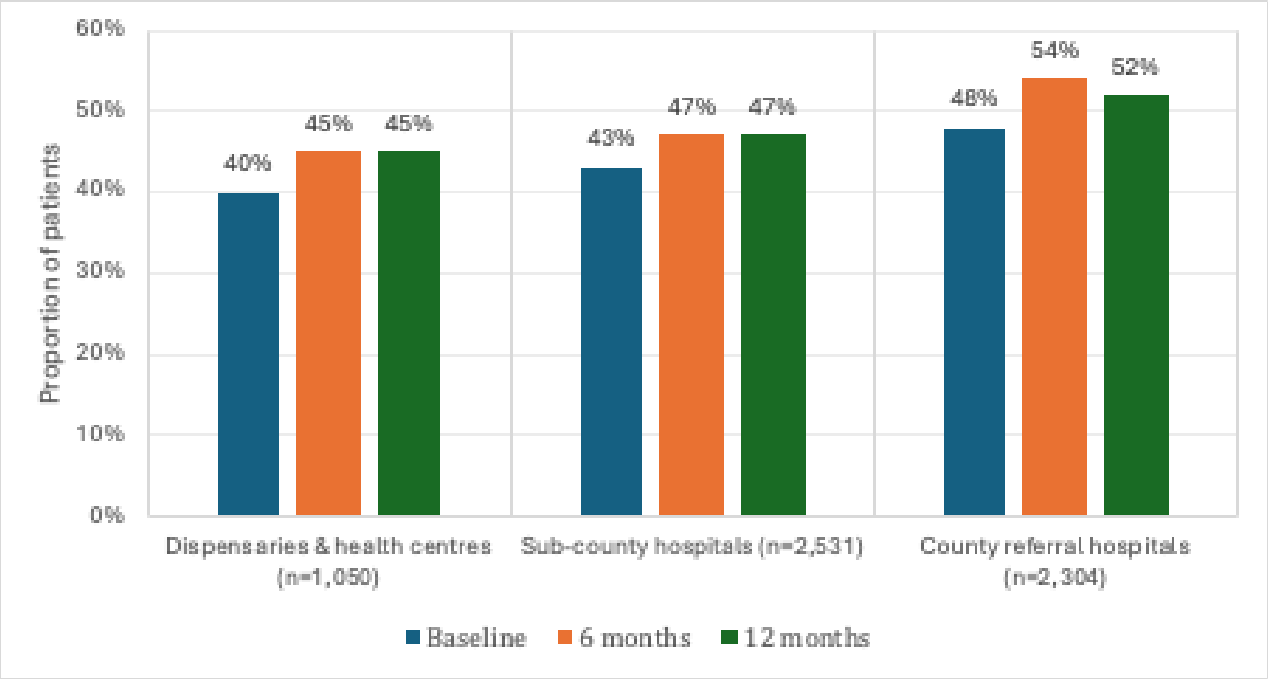

Figure 7. Changes in glycemic control by facility type

Despite similar control rates, patients at dispensaries and health centres showed greater fasting glucose reductions (-1.6 mmol/L) compared to sub-county hospitals (-0.7 mmol/L) and county referral hospitals (+0.2 mmol/L) as shown in Table 3. However these differences were not statistically significant (p=0.111) and overall control remained suboptimal across all levels.

Table 3 Changes in blood glucose levels

	Fasting blood glucose (mmol/L)			Random blood glucose		
	Dispensaries& Health centres	**Sub-county Hospitals (n=336)**	**County Referral Hospitals (n=63)**	**Dispensaries& Health centres**	**Sub-county Hospitals (n=806)**	**County Referral Hospitals (n=1,255)**
Baseline	11.1 (6.0)	9.3 (4.5)	8.5 (4.2)	12.2 (6.2)	11.1 (5.3)	10.6 (6.0)
6 months	10.1 (4.6) Δ -1.0	8.6 (4.1) Δ -0.7	7.5 (3.5) Δ -1.0	10.7 (5.2) Δ -1.5	10.6 (5.1) Δ -0.5	9.9 (5.2) Δ -0.7
12 months	9.5 (4.7) Δ -1.6	8.6 (3.9) Δ -0.7	8.7 (4.6) Δ +0.2	11.2 (5.5) Δ -1.0	10.7 (5.1) Δ -0.4	10.2 (5.3) Δ -0.4

Δ: BG changes from baseline

DISCUSSION AND IMPLICATIONS

Demonstrating PHC capability with appropriate support

The similar/superior outcomes at dispensaries and health centres challenge conventional assumptions about the relationship between facility sophistication and care quality. When equipped with digital clinical decision tools, standardized protocols, regular mentorship, and basic equipment, these lower-tier facilities achieved blood pressure reductions and control rates matching or exceeding those of hospitals. Digital technology enabled health workers at dispensaries and health centres to make evidence-based treatment decisions, while regular supervision ensured continuous quality improvement. This demonstrates that with structured support systems, primary care facilities can deliver quality NCD care, validating WHO PEN approaches and African frameworks for task-shifting.[9,10,16]

8

The mean systolic blood pressure reduction of 12.9 mmHg achieved at dispensaries and health centers has substantial population health implications. Studies demonstrate that a 10-mmHg reduction in systolic blood pressure reduces the risk of major cardiovascular events by 20%, stroke by 27%, heart failure by 28%, and all-cause mortality by 13%.[18] Therefore, the 12.9 mmHg reduction observed at these facilities could potentially reduce cardiovascular events by 20-30%, representing significant population health gains from decentralization.

6

Understanding population differences

The dramatic improvements at dispensaries and health centres may partially reflect different patient populations. Lower-tier facilities likely managed newly diagnosed patients from community screening with higher baseline blood pressure (147.8 vs 140.9 mmHg at county referral hospitals) and lower baseline control rates (32% vs 46%), while hospitals concentrated complex cases with complications, treatment resistance, and longer disease duration. However, even accounting for these differences, achieving 63% control rates at dispensaries and health centres represents clinically meaningful success that supports decentralization without quality compromise.

The proximity advantage in retention

The finding that dispensaries and health centres achieved better follow-up rates underscores that proximity matters versus sophistication for chronic disease retention. Patients were more likely to maintain care when services were within walking distance, avoiding transportation costs, time away from work, and overwhelming hospital environments. This proximity advantage was particularly evident for hypertension, where regular monitoring is essential but technically simple.

Studies from similar settings confirm that reducing geographic barriers significantly improves NCD care continuity.[16,19]

The Sub-County hospital paradox

The low performance at sub-county hospitals, traditionally the backbone of NCD care—warrants attention. These facilities may be experiencing system strain from serving as both primary NCD providers and referral centres, creating congestion that compromises care quality. Literature suggests that unclear role definition and inadequate resource allocation at mid-level facilities can undermine entire health systems.[20]

Persistent system-wide challenges

Despite relative advantages at dispensaries and health centres, the overall retention crisis, with three-quarters of patients lost to follow-up, reveals fundamental system failures. A county-level stock status exercise conducted as part of the program covering 19 facilities revealed stark differences between hypertension and diabetes medicine availability. Amlodipine, a first-line antihypertensive was available in 74% of facilities and hydrochlorothiazide in 95%, while metformin, the first-line diabetes medicine, was available in only 21% and gliclazide in 5%. This differential availability correlates with the observed disparity between hypertension and diabetes outcomes. Further when medicines aren't reliably stocked, patients rationally disengage, creating vicious cycles where lost patients lead to inaccurate forecasting and continued shortages. Without reliable access to these essential drugs, gains in decentralization risk being undermined.

The modest glycaemic control improvements also reflect the absence of structured lifestyle interventions in the initial program design. While hypertension responds well to medication-based algorithms, diabetes requires intensive dietary counselling, weight management, and physical activity promotion, components now being addressed through enhanced programs.

Recommendations for scale up

Successful decentralization requires comprehensive support systems beyond simply shifting services to lower levels. Digital clinical decision tools, accompanied by structured mentorship programs with specialist visits and continuous professional development are critical components to ensure quality. Clear patient stratification protocols should direct uncomplicated cases to these facilities while maintaining hospital capacity for complex management.

Supply chain strengthening emerges as a key priority. This includes ring-fencing NCD commodities, mandating sufficient buffer stocks and implementing demand-based ordering systems using digital platform data.

Retention strategies should address both proximity and system barriers. Mechanisms that have worked for other disease areas and in other settings include differentiated service delivery with 3–6-month refills for stable patients, SMS reminders with community-based defaulter tracing, and telemedicine services. Patient-held records and enhanced interoperability across digital systems would enable continuity across facilities.

For diabetes specifically, structured lifestyle intervention protocols need integration into routine care, including standardized counselling tools, peer-to-peer support systems, and digital-enabled direct to patient behavioural interventions.
Finally, the paradoxical underperformance of sub-county hospitals requires targeted investigation and support to clarify their role as functional referral hubs rather than overcrowded primary care points.

CONCLUSION

The Empower Health Program provides insights for NCD decentralization in resource-limited settings. Most significantly, it demonstrates that when dispensaries and health centres receive digital support, training, mentorship, and basic tools, they can achieve clinical outcomes matching or exceeding higher-level facilities.

While population differences between facilities may partially explain the significant improvements at dispensaries and health centres, the fundamental conclusion remains valid: decentralization can expand access without compromising quality when implemented with appropriate support systems. The superior retention at nearby facilities confirms that proximity trumps sophistication for chronic disease management.

However, systemic challenges persist. With only one-quarter of patients maintaining regular follow-up, and modest diabetes outcomes highlighting gaps in lifestyle interventions and commodity availability, comprehensive health system strengthening remains essential.

As Kenya pursues universal health coverage and aims to reduce premature NCD mortality, these lessons offer a clear path forward. Primary health facilities, when properly equipped and supported, can serve as the foundation for NCD control, bringing quality care closer to communities while enabling hospitals to focus on complex cases requiring specialized expertise.

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