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DIGITAL TRANSFORMATION FOR PERSON-CENTERED NCD AND MENTAL HEALTH CARE

A PRACTICAL PRIMER

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CONTENTS

Abbreviations

CBIS	Community-based information system
CHP	Community health promoter
CHW	Community health worker
CMD	Cardiometabolic disease
eCHIS	Electronic Community Health Information System
EHR	Electronic health record
EMR	Electronic medical record
FHIR	Fast Healthcare Interoperability Resources
GIS	Geographic information system
HCW	Health care worker
HEA	Health enterprise architecture
HIE	Health information exchange
HMIS	Health management information system
HRIS	Human resource information system
HRH	Human resources for health
ICT	Information and communications technologies
LMIS	Logistics management information system
MOH	Ministry of Health
NCD	Noncommunicable disease
PHC	Primary health care
SLUHIS	Saint Lucia Health information System
SSM	Sức Sống Mới

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About the Primer

The goal of this Primer is to be an accessible reference guide for stakeholders who want to improve noncommunicable disease (NCD) and mental health care service delivery. As a reference guide, it is meant to be consulted, not read like a report. Readers should take advantage of the embedded links to access relevant sections.

The target audience is health system planners and funders focused on improving NCD and mental health outcomes. The Primer may also be useful to implementers and innovators seeking to drive improvements across the NCD and mental health care continuum.

Use the tabs to navigate to the appropriate section:

1. **Introduction:** How digital health can help improve person-centered NCD and mental health care as a part of primary health care (PHC)
2. **Care continuum:** Common steps in NCD and mental health care journeys
3. **Barriers:** Challenges patients typically face during NCD and mental health care journeys
4. **Digitally enabled care:** How digital health can support patient journeys and how health information exchange unlocks the value of digital health
5. **Digital interventions:** A breakdown of barriers commonly faced at each step of the care cascade and the digital interventions that can help overcome them:

Each subsection is designed to **help health system stakeholders identify specific digital approaches** that can overcome common barriers for that step of the care continuum, illustrated by real-world examples.

6. **Next steps:** Recommendations and resources for operationalizing the information given in this Primer.

In addition, **Annex A** includes expanded **case studies**.

Together, these sections help readers **identify actionable opportunities to strengthen person-centered NCD and mental health care through digital transformation.**

1

INTRODUCTION

1 INTRODUCTION

The burden of non-communicable diseases (NCDs) and mental health conditions is staggering—and growing.

NCDs and mental health disorders account for 78% of all years lived with disability worldwide, which amounted to around 285 million healthy years of life lost in 2023.[1] Most premature deaths resulting from NCDs—over 80%—occur in low- and middle-income countries, where prevention, early diagnosis, and quality care are often limited or unaffordable.[2] Meanwhile, nearly one billion people worldwide live with mental health conditions, with most going completely untreated.[3] These conditions not only contribute to poor health outcomes but also deepen cycles of poverty and health inequities, impair labor productivity, and strain health systems. Incremental improvements are no longer sufficient—what's required is a transformation that enables sustained care and puts people's experiences at the heart of how care is designed and delivered.

PHC offers the most effective and equitable foundation for addressing NCDs and mental health.

Health care for NCDs and mental health requires long-term, coordinated support across the life course, including prevention, early detection, and ongoing management. Anchoring services in PHC makes it possible to meet people where they are—both literally and figuratively—with integrated care that responds to their full range of health needs. For NCDs and mental health, person-centered care goes beyond the traditional definition of placing individuals at the center of the health system. It means tailoring approaches to people's needs, values, and circumstances, empowering patients as active partners in shared decision-making, and applying these principles wherever care occurs—from clinical settings to community programs to daily life.

Digital health can be a powerful enabler for person-centered NCD and mental health care.

Digital health interventions can align health services, enable self-care, and strengthen shared decision-making while bolstering health system functions like finance and human resources for health (HRH).[4] When **digital health applications** are designed to be interoperable, they improve care continuity by connecting patients, providers, and systems. Digital health can be key to unlocking the benefits of **team-based care**: a person-centered approach to health care that enables providers, caregivers, and the patient to collaborate, contributing to high-quality, coordinated care.

Box 1: *Key Terms*

Digital health: The systematic application of information and communications technologies (ICT), computer science, and data to support informed decision-making by individuals, the health workforce, and health systems to strengthen resilience to disease and improve health and wellness.[5]

Digital health interventions: Discrete technological functionalities, or capabilities, designed to achieve specific objectives addressing health system challenges.

Digital health applications: The software, ICT systems, or communications channels that deliver or execute digital health interventions and health content. These tools are often developed using shared data architecture and standards, such as Fast Healthcare Interoperability Resources (FHIR), facilitating interoperability and data exchange.[6] A single digital health application can offer multiple digital health interventions.[7]

Digital team-based care: A person-centered model for health service delivery where health providers—including facility staff, community health workers (CHWs), campaign teams, pharmacies, and even families—coordinate care using digital tools and data, enabling more timely, consistent, and high-quality service delivery.

Digital health can bridge sectors to address underlying social determinants of health.

NCDs and mental health conditions are profoundly shaped by social determinants—such as income, education, gender inequality, employment, social isolation, and exposure to violence—which influence risk and recovery. Digital health can help extend prevention, early detection, and support across the life course, reaching people in schools, workplaces, and communities. For example, school-based applications can promote emotional well-being and early identification of distress among adolescents; workplace wellness platforms can support adults with managing stress and chronic conditions; and virtual peer networks can help older adults maintain independence and social connection.

Equally important, digital health can strengthen the link between health services and the broader systems that influence well-being. Integrated digital referral and case management tools can connect individuals not only to health workers but also to social protection and community programs, such as money transfers, disability or housing benefits, transport subsidies, nutrition assistance, and gender-based violence protection services. These systems can foster coordination and accountability for shared outcomes across sectors. In doing so, digital health can help operationalize a whole-of-society approach to NCDs and mental health—anchored in PHC yet extending its reach into the socioeconomic conditions that determine health, resilience, and equity relevant for NCDs and mental health conditions. **This primer explores how countries and their partners can leverage digital health to reimagine NCD and mental health care as a part of person-centered PHC.**

2

THE CARE CONTINUUM FOR NCDs AND MENTAL HEALTH

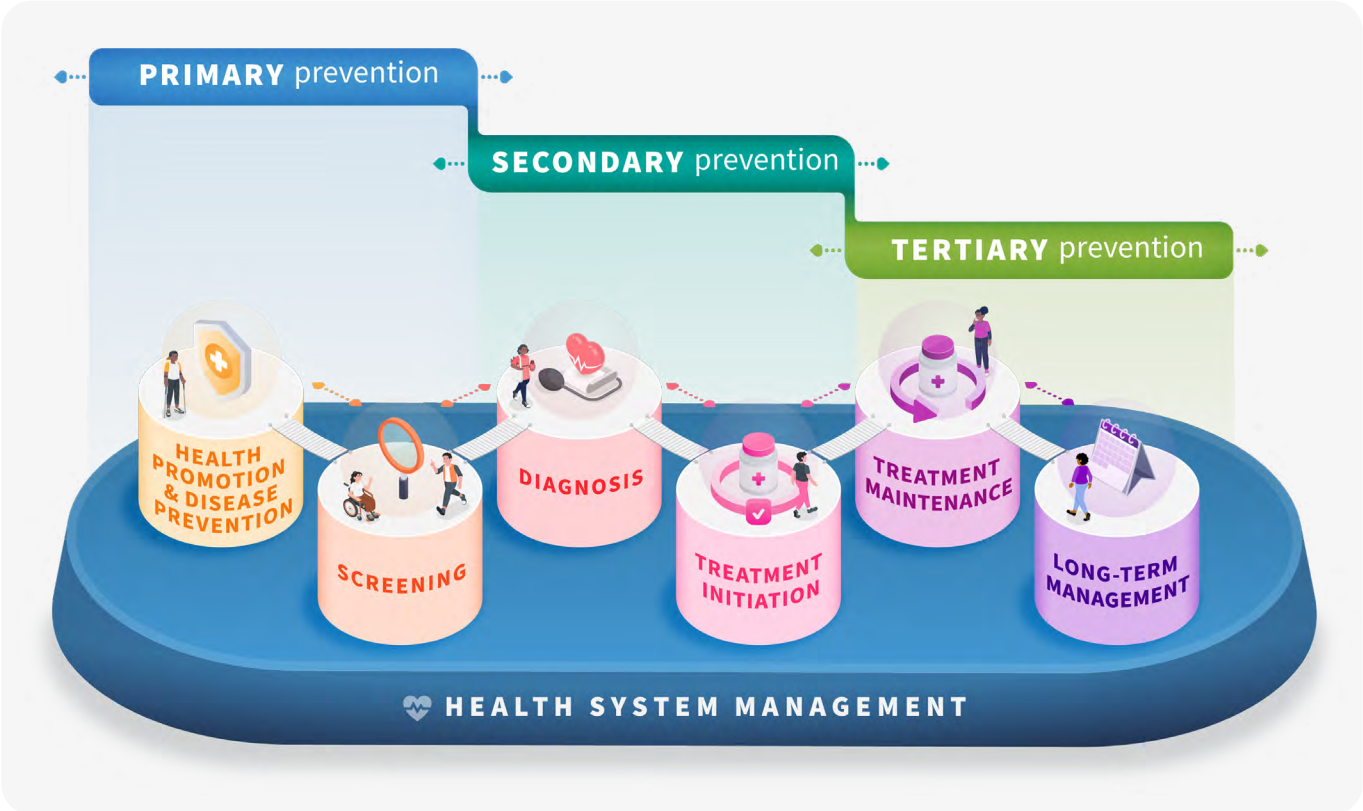
2 THE CARE CONTINUUM FOR NCDS & MENTAL HEALTH

The care continuum model describes the functions necessary to support care for chronic conditions and reduce the burden of disease. Actions to manage chronic conditions follow a general pathway and can be conceptualized as different levels of prevention, bolstered by health system functions, as illustrated in Figure 1.[8] **Primary prevention**—the first level of prevention—aims at reducing risk factors and preventing the onset of NCDs and mental health conditions, usually through education and behavior change. Corresponding activities in the care continuum include **health promotion**, creating the conditions for good health, and **risk prevention**, taking steps to reduce specific disease risk factors.

Secondary prevention encompasses early detection and prompt treatment. In the care continuum, this includes **screening**: the proactive process of assessing populations to identify those at risk or in the early stages of an NCD or mental health condition. This in turn supports **diagnosis**: positive identification of a disease or condition, which can incorporate treatment to prevent conditions from progressing.

Tertiary prevention seeks to reduce complications and improve quality of life for those with established conditions. It involves **long-term management**: managing chronic or multiple conditions through clinical care as well as functional, psychosocial, and lifestyle support to preserve well-being and prevent complications or disability (in addition to palliation, when needed). Effective secondary and tertiary prevention can include both **treatment initiation** and **treatment maintenance**, the continuation of treatment to address chronic conditions. Achieving comprehensive prevention across all levels requires well-coordinated health system functions encompassing governance, policy and planning, financing and insurance, HRH, and supply chain management.

Figure 1: NCD and Mental Health Care Continuum



3

BARRIERS IN NCDs AND MENTAL HEALTH CARE JOURNEYS

3 BARRIERS IN NCDs & MENTAL HEALTH CARE JOURNEYS

Patients often experience challenges moving through the care continuum, and they do not always progress through it linearly, as the arrows in Figure 1 illustrate. Sometimes this is attributable to patient decisions, such as pausing and reinitiating treatment. In other cases, care continua are not set up for patients to progress smoothly from step to step. For example, screening programs may operate independently of diagnostic facilities. Even when screening and diagnoses are successful, the inability to share information between facilities can result in providers repeating diagnostic steps, and referral mechanisms between different levels of care may be weak or absent. Patients may also seek care in a variety of locations, including at drug dispensaries or from other informal care providers.

Understanding how patients navigate care and the nature of the barriers they face along the care continuum is key to improving NCD and mental health care because it helps identify where interventions are likely to affect patient experiences and outcomes. **Approaches such as Patient Pathway Analytics ↗ and care continuum analytics offer methodologies for taking a person-centered approach to identifying these barriers**.[9]

These analyses follow the individual's care journey, recognizing that people's care-seeking patterns are shaped by their circumstances, preferences, and available options. By mapping how people actually seek care, what challenges they encounter, and what matters most to them, stakeholders can identify bottlenecks where interventions may make the biggest difference for outcomes.

The World Bank has supported multiple evaluations analyzing barriers in the care continuum for chronic conditions, which provide rich data on the types of barriers to accessing high-quality care that individuals face.[10] Analysis of the barriers reported in evaluations from five countries reveals that although the specifics vary by country and condition type, the barriers stakeholders experience have commonalities across contexts. **These barriers can be divided into nine domains[11]:**

- **Care coordination and continuity**
- **Human resources**
- **Quality of care**
- **Patient knowledge, motivation, and empowerment**
- **Access to services**
- **Affordability**
- **Supply chain**
- **Monitoring, program management and performance oversight**
- **Intersectoral and community collaboration**

For example, poor patient experiences attributable to long wait times, impersonal staff interactions, or lack of empathy can disincentivize patients from continuing care. Inconvenient scheduling, difficulty booking appointments, or lack of follow-up can lead to patient disengagement. Billing and insurance issues, unexpected costs, or lack of insurance coverage can push patients to find more affordable—and sometimes lower quality—options. Frequent changes in care teams or lack of continuity can erode patient trust. And accessibility challenges because of facility location, travel time, or hours of operation all affect retention. Health system stakeholders can encounter these barriers at every step of the care continuum, impeding the delivery of high-quality, person-centered care. Understanding these barriers can reveal intervention points that, when addressed, can significantly improve care.

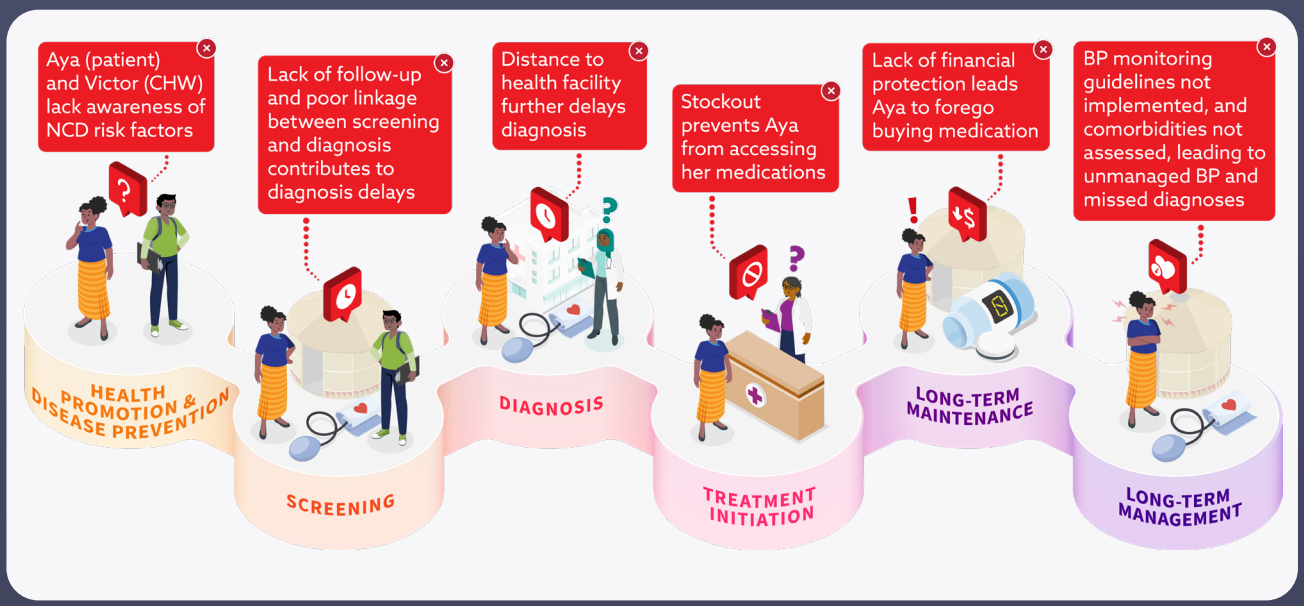
The scenario in Box 2 illustrates typical challenges patients face when addressing chronic conditions. While this vignette focuses on hypertension, these challenges are common across many NCD and mental health care journeys.

Box 2: *Aya's Hypertension Care Journey*

Meet Aya: a 45-year-old market vendor who often skips meals during busy days and relies on processed snacks and high-salt foods for quick energy. She has a sedentary lifestyle outside of work and has noticed weight gain over the past few years. Aya lives in a village, and the nearest health facility is 20 kilometers away.

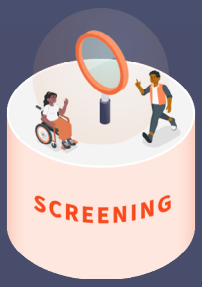
Meet Victor: a CHW who provides basic health services for Aya's village. Although he can recognize common health concerns and refer people to the clinic, he lacks access to current guidelines and educational materials to help patients like Aya prevent and manage chronic conditions.

Figure 2: Barriers in Aya's Hypertension Care Journey



Victor visits Aya several times a year, but neither of them is aware of hypertension risk factors or habits to promote healthy living, so they don't discuss behavior changes.

Human resources: Victor lacks the training to provide Aya with health coaching.



In keeping with the national NCD strategic plan, the District Health Office plans a hypertension screening campaign, and Victor is recruited to support it. He takes Aya's blood pressure and the reading is high, so he refers her to a health facility. Aya feels healthy, and it is difficult to get to the facility, so she delays going for many months.

Care coordination and continuity: With no follow-up procedures in place, Victor does not check to make sure Aya has gone to the clinic, resulting in a delay in her diagnosis.

Patient knowledge, motivation, and empowerment: Aya does not know that high blood pressure can cause her long-term problems even if she feels okay now.

Aya goes to the clinic several months later for an unrelated reason. Her blood pressure reading is high, so she is asked to return to have it rechecked, but Aya delays because the clinic is far. When she does go back, she is diagnosed with hypertension and prescribed medication.

Access to services: The nearest clinic is 20 kilometers away, which is hard for Aya to reach.

No medicine is available at the pharmacy for that month. Aya must return several weeks later to pick up her medication.

Supply chain: Stockouts delay Aya's ability to initiate treatment.

Aya eventually gets her medication, but she must refill her prescription regularly to maintain treatment, and some months she cannot afford it.

Financial burden: Without financial protection, the cost of Aya's medication is sometimes too high for her.

National guidelines state that people living with hypertension should have their blood pressure monitored regularly, but Aya does not go to the clinic often because it is far, and Victor does not have the tools to check her blood pressure. When Victor visits Aya, she shares that she has become very thirsty. Victor does not know why and recommends she bring it up when she goes to the clinic, but by that time, Aya has forgotten. Aya's blood pressure remains uncontrolled, but without monitoring or awareness of common comorbidities, neither Aya nor her care team knows that her treatment approach is failing and she should be tested for diabetes.

- **Quality of care:** National guidelines on monitoring are not followed, leading Aya's care team to miss that her blood pressure is uncontrolled.
- **Care coordination and continuity:** Aya's care team at the clinic does not know she is having symptoms that indicate she could have diabetes, a common comorbidity with hypertension.

Conclusion

During this care journey, a lot went right for Aya: She was screened, got diagnosed, and even got treatment. She faced barriers throughout the journey, though, and ultimately, she wound up—like around 20% of people living with hypertension today—on treatment but with her blood pressure uncontrolled.[12] Aya now faces increased risk of heart attack, stroke, kidney disease, and diabetes—conditions that can profoundly affect her quality of life while generating substantial costs for the health system and society.

When digital approaches are strategically designed and implemented, they can help address the challenges that Aya and her care team face to change her outcomes. To learn more about how digital technology supports Aya's health journey, see Box 7.

4

DIGITALLY ENABLED CARE CONTINUUM

4 DIGITALLY ENABLED CARE CONTINUUM

Once patient pathways are understood and barriers to the care journey are identified, digital interventions can offer a variety of approaches to address these challenges. Figure 3 shows a digitally transformed care continuum, highlighting how digital health can **strengthen individual steps** and **bolster connections** between different elements of a care journey.

Figure 3: Digitally Enabled Care Continuum

Data Exchange: The Key to Unlocking Digital Health's Value

Although digital health has the potential to improve person-centered NCD and mental health care, it is no panacea. In many countries, legacy digital systems duplicate functionalities and contribute to a fragmented data ecosystem, which can be expensive for health system stakeholders and make it difficult to access data for decision-making.[13] Implementing digital health applications that can sustainably contribute to improved health outcomes requires long-term planning and change management (see **Section 6**).

Much of the value that digital health brings is realized only when digital systems are designed for **interoperability**, which allows multiple systems to communicate by accessing, exchanging, and using data in a standardized, systematic way. Facilitating interoperability at scale for the health sector requires careful planning and collaboration. To do this, many countries develop **health enterprise architectures**.

Box 3: *Health Enterprise Architecture*

A **health enterprise architecture (HEA)** is the convergence of business processes, data, standards, digital health applications, and workflows to support the health sector's needs and enable interoperability. The HEA is often depicted as a diagram in a country's planning document, accompanied by the technical specifications necessary to implement the desired functionalities, capabilities, and services.[14]

HEAs create the foundation for interoperable, scalable technologies.
They provide the blueprint for mapping how digital systems and processes should support strategic health objectives. A strong HEA also defines the data standards, such as HL7 FHIR, that guide how health data are formatted, labeled, and shared across systems. HEAs set the governance, policies, and shared technical principles to ensure that new systems are compatible from the start, reducing fragmentation and duplication. This creates a stable foundation for coordinated and scalable digital transformation across the health system.

Within this broader framework, a **health information exchange (HIE)** plays a more targeted role: **HIEs enable the secure, standardized electronic sharing of health data between different digital health applications**. If an HEA is like a blueprint, defining the overall strategic plan for how the digital health ecosystem will operate, an HIE is like the highway system, built according to the HEA blueprint and providing transportation infrastructure within the ecosystem. An HIE is designed to facilitate interoperability, allowing clinical information—such as patient histories, lab results, and medication lists—to be accessed and exchanged in real time, regardless of where the data was generated.

Box 4: *Benefits of an HIE*

Although it is possible to connect two systems directly to share information, this approach becomes difficult to manage as more systems are added. HIEs address this in part with **shared registries**: central databases that store key reference information such as who patients are (client registry), which health workers and facilities provide services (health worker and facility registries), and standardized codes and classifications used to record diseases, lab tests, and treatments (terminology service). These registries save time and improve accuracy because each point-of-service application does not have to collect and maintain these data itself. Registries also provide a common language to help digital systems recognize and link to the same people, places, and data, reducing errors, duplication, and fragmentation while making the overall digital health ecosystem easier to expand and maintain.

The **World Bank's Digital Health Blueprint Toolkit ↗**[15] helps countries develop buildable digital health blueprints that are contextualized to the country's health priorities. This enables countries to create not just an HEA but also the costing, governance, and investment rationale for the HEA over a multiyear period.

Strengthening Health System Functions

Providing high-quality chronic care requires a robust health system. Digital approaches can strengthen health system functions with data and analytical capabilities:[16]

- **Policy and planning:** Digital solutions can enable real-time monitoring through dashboards, predictive modeling for disease trends and workforce needs, and geospatial analysis to target underserved areas.
- **Financial management:** Digital approaches can transparently track health expenditures, automate claims processing in insurance schemes, and leverage utilization data to guide equitable resource allocation.
- **Workforce management:** Digital HRH registries can serve as authoritative sources for credential verification and workforce planning, and digital tools can support workload analysis, productivity optimization, and personalized learning.
- **Supply chain management:** Electronic logistics management information systems (LMIS) and other digital resource planning systems can improve visibility on stock levels, enable predictive analytics for supply forecasting, and facilitate tracking to reduce stockouts and wastage.
- **Service delivery and quality:** Digital health can generate real-time performance data through electronic health records (EHRs) and visualize integrated indicators across programs, laying the groundwork to enable AI tools to strengthen decision support and quality improvement
- **Governance and accountability:** Digital health can enhance transparency via open data portals that allow citizens, researchers, and civil society to see progress on health outcomes and budgets, collect citizen feedback through digital platforms, and improve coordination.

Box 5: Improving Service Delivery and Quality with Data in Saint Lucia

Saint Lucia is using its national electronic medical record (EMR) system—Saint Lucia Health information System (SLUHIS)—to support patient care and monitor service delivery for continuous improvement. Data from SLUHIS are aggregated and visualized on live dashboards for the Ministry of Health (MOH) and health facilities, providing real-time insights into facility performance, service utilization, and quality outcomes. For the full story, see the SLUHIS case study A-3.

Addressing the Demand for Health Services

Efforts to improve health outcomes often focus on approaches that take place within the health system: improving clinical protocols, training health care workers (HCWs), and optimizing service delivery. These **supply-side approaches** work through the health system to increase health service provision and quality. Digitally enabled supply-side approaches include interventions such as EHRs and clinical decision support tools. Although supply-side approaches are essential, they represent only one part of the equation for harnessing the full potential of digital tools to support NCD and mental health care.

Demand-side approaches can help individuals increase healthy behaviors and facilitate self-care, decreasing demand on the health system. For NCD and mental health conditions, which are influenced by the social determinants of health[17] and may require sustained lifestyle modifications and long-term self-management, tactics that support people beyond the formal health system become important. Examples of digitally enabled demand-side approaches include wearable technologies to monitor blood sugar and fitness and on-demand health information and behavior change support through chatbots (see the **mDoc A-6** and **ISACare A-8** case studies for examples). Digital health solutions offer unique opportunities to reach people in their daily lives, providing education, motivation, and tools for prevention and self-management, which can extend the impact of health systems far beyond clinic walls.

Box 6: *Empowering Patients: ISACare's Approach to Home-Based NCD Management*

To strengthen NCD care and ease the burden on Brazil's health system, ISA Saúde launched ISACare, a tech-enabled home health service focused providing hospital-level medical care at home. Using a digital platform with integrated EMRs, ISACare coordinates team-based care, supports real-time monitoring, and empowers patients to actively manage their health from home. Patients and caregivers can use a patient portal to access records, schedule visits, and input health data for ongoing monitoring. Currently ISACare is piloting the use of connected diagnostics like blood pressure monitors, glucose meters, and oximeters, for automated monitoring. By expanding access to home-based NCD management and partnering with insurers, ISACare is helping Brazil advance its digital health strategy, improve outcomes, and reduce reliance on hospital-based care. For the full story, see the **ISACare case study A-8**.

Overcoming Care Journey Barriers with Digital Health

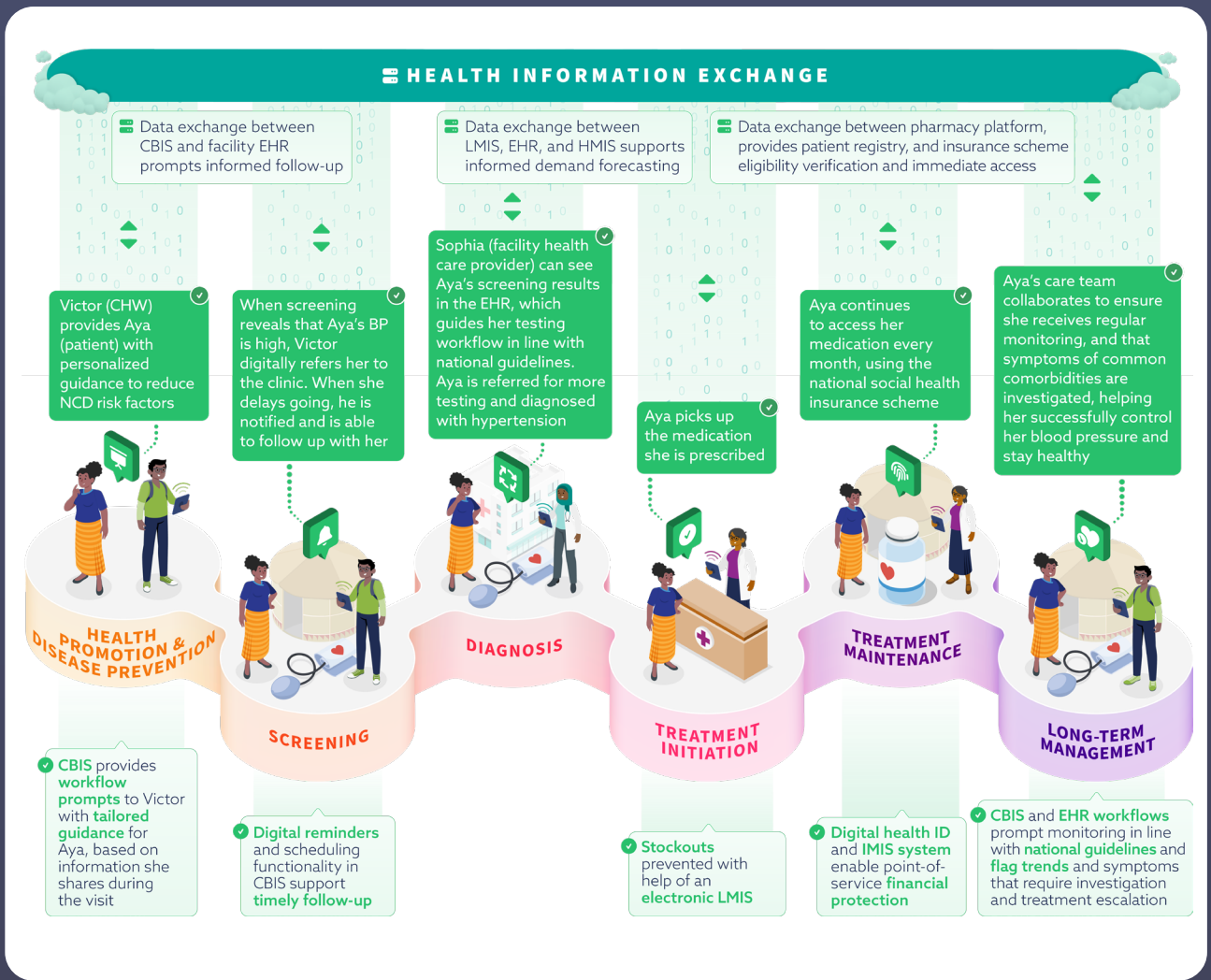
The care journey depicted in Box 7 shows how digital approaches, when supported by a strong HIE, can address barriers across the care continuum. Although this example focuses on hypertension, the same digital approaches could help enable patient-centered, team-based care for many different NCDs or mental health conditions.

Aya's Digitally Enabled Hypertension Care Journey

This is a different version of Aya's story than the one illustrated in **Box 2**. This time, her care journey is supported by interoperable digital health systems, which help Aya and her care team better coordinate her care and manage her health.

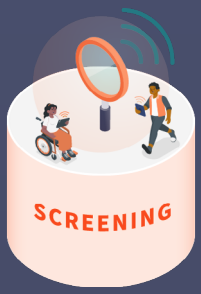
Box 7: *Aya's Digitally Enabled Hypertension Care Journey*

Figure 4: Digital Interventions in Aya's Hypertension Care Journey



When the CHW, Victor, visits Aya at her home, he uses an offline-first, community-based information system (CBIS) on his smartphone to document the visit and help him provide personalized support. Victor's tool prompts him to ask Aya about her diet and physical activity. Based on the responses that Victor records, the tool gives him tailored guidance he can share with Aya to help her adopt habits to reduce her health risks.

Human resources: The CBIS provides resources for Victor to offer health coaching.



During a screening campaign, Victor takes Aya's blood pressure. He enters the reading into his CBIS, and the system flags the reading as high, so he digitally refers her to a facility. A few weeks go by, and the CBIS notifies Victor that Aya has not gone to the clinic. A visit to Aya is automatically added to his schedule, and he follows up.

Care coordination and continuity: Victor is notified that Aya did not visit the facility, and he is responsible for following up to ensure she goes.

Patient knowledge, motivation, and empowerment: Aya has access to information that can help her understand the risks that high blood pressure poses and the need to get tested.

Sofia, the facility health care provider, uses an EHR system, which communicates with the CBIS through an HIE. Sofia can see Aya's referral and previous blood pressure reading. When Sophia retakes Aya's blood pressure, it is still high. Per the national guidelines, Sofia tells Aya to return for a confirmatory test. Aya delays returning at first because the facility is far, but Victor reminds her of the importance to her health. She returns and is diagnosed with hypertension.

Care coordination and continuity: Aya's care team is aware of her progress through the care continuum and prepared to help her if she needs support.

Access to services: The facility is far away, which makes returning difficult.

When Aya goes to pick up the medicine she was prescribed, it is in stock because data aggregated from digital systems in use at health facilities help the MOH accurately forecast demand using an LMIS and help pharmacies manage their supply chain.

Supply chain: Aya can access the medication she needs when she needs it because of improved logistics management.

When Aya picks up her medicine, the pharmacist's digital system uses Aya's digital health ID to verify her insurance eligibility instantly. Aya can access her medicine for free, offering her financial protection.

Affordability: With digital access to her insurance, Aya has on-the-spot financial protection, which makes her medicine affordable and helps her maintain her treatment regime.

Victor's digital app flags that Aya needs to be monitored every three months, and he returns regularly to take her blood pressure. Over the next six months, there is no decrease in Aya's blood pressure, so Victor digitally refers her to the facility. Aya also mentions that she's been feeling very thirsty, and Victor notes that in his referral. When Aya goes to the facility, Sofia can see Aya's record. Sofia escalates Aya's hypertension treatment regime and tests for diabetes. Aya's care team can see this in her records, and Aya is automatically scheduled for regular follow-up visits per the national guidelines, which can be conducted using a telehealth system. Armed with accurate, up-to-date information, Aya and her care team can tailor Aya's care plans to meet her needs and protect her health.

Quality of care: National guidelines on monitoring and follow-up visits help ensure that any issues with Aya's treatment are caught.

Care coordination and continuity: Aya's care team can share information about her potential diabetes symptoms and her diagnosis.

Conclusion

Even in this digitally enabled version of Aya's journey, she continues to face challenges, such as having to visit faraway facilities and the daily realities of managing NCDs. However, interoperable digital systems give Aya and her care team the visibility and tools they need to act earlier and coordinate more effectively.

Aya can use simple, low-cost self-monitoring tools—such as a digital blood pressure cuff or portable glucometer available in her community—to check her readings at home and share them with her care team through SMS or telehealth. These affordable options help her track her progress, get timely guidance, and reduce travel to the clinic. Although digital health does not remove every barrier, it enables continuous, person-centered care that helps Aya live a healthier life.

5

DIGITAL INTERVENTIONS TO ADDRESS BARRIERS

5 DIGITAL INTERVENTIONS TO ADDRESS BARRIERS

This section of the Primer maps common barriers at each step of the care continuum to digital interventions that can address them, including examples of relevant applications and real-world case studies. The barriers—which are meant to be illustrative, not comprehensive—are based on those reported in care continuum assessments from Bangladesh, Samoa, Saint Lucia, Tajikistan, and Ukraine as well as some illustrative additions that are common globally.[18]

Because the profiled digital interventions are most effective when they work together as part of a connected digital health ecosystem, digital solutions should be implemented to facilitate scalable data exchange (**Section 4**) and in alignment with the digital health enabling environment and user-centered design principles (**Section 6**).

This section serves as a reference that readers can use to identify digital interventions and applications to address common barriers. For each step of the care continuum, a table lists common challenges—organized by barrier domain—that stakeholders face. Digital interventions that could help overcome these barriers are provided for each barrier domain, including examples of digital applications that typically support these types of interventions.[19]

Screening | Diagnosis | Initiation | Maintenance | Management

Health Promotion and Disease Prevention

Health promotion and disease prevention are cost-effective approaches to addressing chronic conditions that help populations remain well for longer.[20] Leaning into prevention strategies gives countries the opportunity to address NCD and mental health burdens proactively, avoiding future costs while improving people's lives, but these activities face persistent barriers that often limit their reach and impact. Digital approaches such as those listed in **Table 1** can alleviate these bottlenecks, paving the way for improved outcomes.

DEMAND SIDE

Box 8: *Supporting Behavior Change with Digital Health in Nigeria*

Addressing NCD risk factors often requires sustained behavior change, which can be challenging. Digital tools can help individuals build and maintain healthy habits to improve well-being. In Nigeria, the private sector company mDoc Healthcare integrates physical and digital services to meet members where they are, providing self-care support for people living with or at risk of chronic conditions such as hypertension, diabetes, obesity, cancer, anxiety, and depression. Services include in-person sites, capacity building for health workers, a digital platform with access to health coaches, and a digital patient-navigation tool. Through mDoc, members can engage with an AI health coach, which escalates cases to human health coaches for more personalized support, who can in turn refer members to PHC facilities for follow-up care. These services complement facility-based care and combine data, technology, behavioral science, and quality improvement to support members with adopting lifestyle modifications, managing their health, and empowering themselves to live healthier and more fulfilled lives. For the full story, see the **mDoc case study A-6**.

Table 1: Health Promotion and Disease Prevention Barriers and Digital Interventions

	Barrier	Digital interventions to overcome barrier	Example digital health applications*
Care coordination & continuity	Data from community outreach sessions not shared with facility systems, with no visibility on who was counseled or identified as at risk, resulting in lost follow-up opportunities and people with modifiable risk factors dropping out of preventive programs	Record sharing between community- and facility-level digital systems to flag individuals with high risk factors for follow-up and support Virtual coaches or peer groups to support continued engagement with preventive programs	CBIS EHR system[21] Messaging and campaign information system[22] Voice- and text-based chatbot
Human resources	HCWs unavailable or unable to provide high-quality counseling to individuals	Digital workflow prompts and job aids to flag risk factors and guide HCWs with providing relevant counseling Digital learning platforms to help HCWs keep up to date on health promotions and disease prevention approaches	CBIS Digital learning and training system EHR system
Patient knowledge, motivation, & empowerment	Poor patient understanding of NCD and mental health risk factors, prevention, and management, with no way for individuals to get answers to questions about healthy living	Virtual coaches and peer groups Telehealth consultations SMS messages with important health information, such as vaccination reminders and extreme heat warnings	CBIS Messaging and campaign management system Telehealth system Voice- and text-based chatbot
Access to services	Health education materials not available in formats accessible to target populations, such as in local languages or for low-literacy groups. Campaigns focusing on urban centers that do not reach more sparsely populated areas	Digital translation services Interactive voice-response chat options Patient health data used to better target patient-level outreach Text- and voice-based campaigns providing information to populations in remote areas	CBIS HMIS to provide data for campaign targeting SMS and WhatsApp messaging Voice- and text-based chatbot

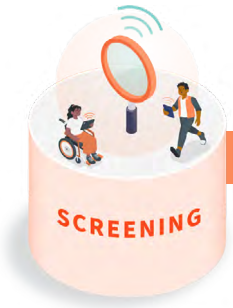
Table 1: Health Promotion and Disease Prevention Barriers and Digital Interventions

	Barrier	Digital interventions to overcome barrier	Example digital health applications*
Affordability	Lack of compensation to HCWs for preventive activities	Digital financial payments to HCWs Digital platform enabling HCWs to log preventive services provided	CBIS Money-transfer platform
Monitoring, program management, & performance oversight	Lack of population- and individual-level health information to target health promotion activities	Information aggregated from registries and patient records used to identify populations with risk factors and target promotion and prevention services	CBIS HMIS EHR system NCD or mental health registry
Intersectoral & community collaboration	Lack of coordination between health, education, and other sectors to promote healthy behaviors and preventive services	Community engagement platforms for CHWs and local leaders to share prevention messages, coordinate outreach, and track participation Campaign management systems to monitor community interventions across sectors, reduce duplication, and enhance accountability	CBIS HMIS

**To deliver expected benefits and address the barriers, applications often require connection to an HIE.*

Digital public infrastructure supports scalable, team-based care approaches

The examples given in Table 1 outline how digital approaches can help overcome barriers to effective health promotion and disease prevention activities for NCDs and mental health. Yet the real value of these interventions is realized only when data can be effectively exchanged between systems, which enables coordinated, continuous team-based care. For example, patient registries, which are part of an HIE, can help ensure that a unique identifier links patient records across different systems. **Digital public infrastructure**—shared, reusable building blocks for common functions across sectors and for public benefit —can be an important input because digital ID and payment rails can provide information or functionality for patient registries and money-transfer platforms. For more on scalable data exchange approaches, see **Section 4**.



Screening

Screening is a critical step in the NCD and mental health care continuum that detects conditions before they progress and cause greater harm, but screening efforts often have barriers limiting their coverage, accuracy, and effectiveness. There can also be challenges with connecting screening to diagnosis and the rest of the care continuum. Digital approaches that facilitate seamless data exchange (see **Section 4**) and enable team-based care, such as those listed in **Table 2**, can alleviate some of these bottlenecks.

DEMAND SIDE

Box 9: *A Digital Tool Enables Self-Screening for Cardiometabolic Disease (CMD) in Vietnam*

The Addressing CMD Care initiative in Vietnam uses a digital platform called Sức Sống Mới (SSM), or the Vitality App, that enables individuals to screen themselves for CMDs by completing a short questionnaire and entering their blood pressure indicators. The application assesses the patient's risk of CMD, and if the risk is high, SSM recommends a PHC health check-up and provides the location and contact details for nearby facilities. A health worker is also notified to conduct follow-up. Today, 100,000 people living in the Thai Nguyen province use SSM, and plans are under way to scale to other provinces. For the full story, see the **Vitality App case study A-4**.

Table 2: Screening Barriers and Digital Interventions

Barrier	Digital interventions to overcome barrier	Example digital health applications*
Care coordination & continuity	Poor referral mechanisms between screenings and diagnosis, including referral-loop closure Lack of information about whether patients receive confirmatory testing Patients unaware of where to go or what to do with screening results	Digital referrals between screening initiatives, PHC facilities, and diagnostic facilities Autogenerated follow-up reminders when referral loops are not closed Autogenerated list for HCWs of referral facilities near patients' homes Health facility information available through chat features on patient-facing applications	CBIS EHR system Patient portal
Human resources	Low capacity and focus on addressing mental health and NCDs at the PHC level	Digital learning platforms to help HCWs keep up to date on effective health promotions and disease prevention approaches	Digital learning and training system
Quality of care	Noncompliance with screening guidelines Various clinical guidelines in use Eligible populations screened for one condition but not others with high comorbidity rates	Digital workflows based on national guidelines to guide screening protocols at the PHC level Screening workflows suggested based on key demographic or risk factor information	CBIS EHR system
Patient knowledge, motivation, & empowerment	Insufficient public knowledge of NCD and mental health challenges and the benefits of early interventions Cultural taboos around mental illness	Digital workflows to prompt health counseling Targeted outreach based on risk factors Telehealth-based screening so patients do not need to go in person	CBIS EHR system Messaging and campaign management system Telehealth system

Table 2: Screening Barriers and Digital Interventions

Barrier	Digital interventions to overcome barrier	Example digital health applications*
Access to services	Geographic or transportation barriers to accessing screening services	Use of improved population- and individual-level health information to target underserved areas Telehealth consultation facilitated by CHWs	Health management information system (HMIS) NCD or mental health registry Telehealth system
Supply chain	Limited availability of screening supplies	Aggregate data used to forecast screening needs Information systems to manage inventory and ordering of needed commodities	CBIS HMIS LMIS
Monitoring, program management, & performance oversight	No accurate estimates of disease prevalence Low-quality data from paper records on screening and treatment Lack of clarity on who needs to be reached for screening, making planning and resource allocation difficult	Aggregate information from digital records to support prevalence calculations Information from patient records used to identify populations and individuals with risk factors for targeted screening Workforce and commodity planning to ensure adequate support for screening campaigns Microplanning approaches, adapted and applied to screening campaigns	CBIS EHR system Geographic information system (GIS) for campaign planning HMIS Human resource information system (HRIS) NCD and mental health registry

**To deliver expected benefits and address the barriers, applications often require connection to an HIE.*

HIE registries are essential for continuous, team-based care

The examples given in Table 2 outline how digital approaches can help overcome barriers to effective screening activities for NCDs and mental health. Yet the real value of these interventions is realized only when data can be effectively exchanged between different systems. Patient and health facility registries—both key parts of an HIE—are critical to supporting care continuity and coordination, which are the backbone of team-based care. A patient registry provides a unique identifier that links patient records across different systems. Health facility registries provide location data for health facilities, so patients know where to go for diagnostic services. For more on scalable data exchange approaches, see **Section 4**.

Diagnosis

Diagnosis, a pivotal step in the NCD and mental health care continuum, confirms the presence of a condition and guides appropriate treatment. Yet diagnosis efforts are frequently hampered by barriers such as limited access to diagnostic tools, variability in provider capacity, and delays in reporting results. For example, global data indicate that more than 40% of the population living with hypertension do not get diagnosed.[23] Of those who do get a diagnosis, 20% do not receive treatment. Strengthening the connections between screening, diagnosis, and treatment initiation with digital interventions such as those listed in **Table 3** can help address these gaps.

Box 10: *Adding a Module to a Scaled EMR to Support NCD Diagnosis in Tanzania*

To better support NCD care and integrate it into PHC, the MOH in Tanzania collaborated with partners to add a dedicated NCD module with diabetes and hypertension workflows to the nationally scaled EMR system. Providers use the NCD module to guide the screening process and support a diagnosis as well as to update the patient's health record. Patients diagnosed with diabetes or hypertension are enrolled in the NCD cohort for long-term treatment and support. The system includes scheduling features that prompt patients to return on designated clinic days for regular monitoring, including blood sugar and blood pressure checks, and medication adjustments. All results are recorded in the EMR, which provides basic decision support to providers by flagging values that require further treatment or counseling and prompting regular screening for complications. By providing support from screening through to monitoring, EMR workflows support continuous, quality care. For the full story, see the **GoT-HOMIS case study A-2**.

Table 3: Diagnosis Barriers and Digital Interventions

	Barrier	Digital interventions to overcome barrier	Example digital health applications*
Care coordination & continuity	Poor referral and tracking mechanisms between screening and diagnosis Lack of timely, accurate diagnostic data sharing between care team members Incomplete or fragmented patient history, hindering accurate diagnosis	Digital referrals with follow-up flags and reminder texts to help close referral loops Interoperable patient records and bidirectional data exchange to ensure availability of patient records and diagnostic results across levels of care	CBIS Diagnostic information system EHR system Laboratory information system
Human resources	Lack of skilled HCWs	Telehealth consultation support Digitally enabled diagnostic devices, such as AI-assisted imaging	Connected diagnostic devices[24] Telehealth system
Quality of care	Various clinical guidelines in use Inconsistent quality of diagnostic procedures and results	Clinical decision support, digital job aids, and workflow prompts aligned with global, regional, and/or national clinical guidelines	EHR system
Patient knowledge, motivation, & empowerment	Limited understanding of chronic conditions and the importance of early diagnosis	Targeted messaging campaigns Job aids to guide counseling on disease risks	CBIS Messaging and campaign management system

Table 3: Diagnosis Barriers and Digital Interventions

Barrier	Digital interventions to overcome barrier	Example digital health applications*
Access to services Need to go to multiple facilities for tests Time and distance to get to facilities	Telehealth consultation support	Telehealth system
Affordability Cost of diagnostics and laboratory services	Digital eligibility verification Digital payment systems	Health insurance information system Money-transfer platform
Supply chain Lack of diagnostic supplies and equipment	Digitally enabled inventory tracking to support management and demand forecasting Health equipment and facility infrastructure modules to track physical assets within health facilities and log maintenance needs	Facility management information system/module HMIS LMIS

**To deliver expected benefits and address the barriers, applications often require connection to an HIE.*

Effective digital interventions rely on strong enabling environments

The examples given in Table 3 outline how digital approaches, when connected via an HIE, can overcome barriers to effective diagnosis of NCDs and mental health conditions. The information exchange facilitated by an HIE improves continuity of care and team-based approaches by enabling HCWs with the appropriate permissions to view patient records. Patient registries, which are sometimes linked to other national-level identification systems, ensure that each patient has a unique identifier. These benefits are not the product of technology alone, though. For digital health to help more people reach a timely diagnosis and initiate treatment, the rest of the digital health enabling environment, including the people and processes that dictate how technology is used, must be supported. For more on this, see **Section 6**.

Treatment Initiation

Treatment initiation marks the point where individuals begin therapy for an NCD or mental health condition, setting the foundation for effective management and improved outcomes. When patients can co-create with providers a treatment plan that they understand, feel confident about, and can realistically manage, they are better positioned for success in long-term care.

This step is often constrained by gaps in provider adherence to guidelines, limited patient engagement, affordability, and supply chain challenges that affect medication availability. The digital interventions listed in **Table 4** can help address these gaps.

Box 11: *Nepal Deploys a Digital Solution to Enable Access to Social Health Insurance*

For many patients, inability to pay for medicines prevents them from initiating treatment. Social health insurance can address financial barriers, and digital solutions can ensure that patients can seamlessly access their benefits.In Nepal, the government has rolled out OpenIMIS, a software solution that supports the administration and management of the country's social health insurance program. PHC facilities use OpenIMIS to verify patient benefits at the point of service and submit claims for reimbursement, and patients use their QR-based insurance card to access medicines and care, helping overcome affordability barriers. For the full story, see the **OpenIMIS case study A-7**.

Table 4: Treatment Initiation Barriers and Digital Interventions

	Barrier	Digital interventions to overcome barrier	Example digital health applications*
Care coordination & continuity	Poor patient support for linkage to treatment Weak follow-up to ensure that patients successfully initiate treatment	Referral and case management tools to track initiation status and flag missed starts	CBIS EHR system
Human resources	Shortage of qualified providers authorized to initiate NCD or mental health treatment	Clinical decision support systems to facilitate guidelines-aligned treatment initiation E-learning courses to support online training and assessments for non-physician providers Digital supervision and mentorship to support advanced task shifting	CBIS Digital learning and training system EHR system Telehealth system
Quality of care	Lack of standardized treatment protocols Inadequate patient engagement by HCWs Gaps in provider compliance with clinical guidelines Inadequate integration of patients' beliefs, use of traditional medicine, and socioeconomic circumstances into care planning	Digital job aids and clinical decision support, with contextual input, to guide care-plan creation, prescriptions, and patient education Digital counseling and education tools with locally adapted content Patient feedback mechanisms	EHR system and patient portal Pharmacy information system Telehealth system
Patient knowledge, motivation, & empowerment	Limited patient understanding of their condition, treatment plan, and required lifestyle changes Insufficient support for patient empowerment and shared decision-making Lack of accessible materials or communication aids to reinforce understanding and adherence	Digital education and counseling tools to provide accessible explanations and support for treatment initiation Personalized communication and reminder systems HCWs educated to provide patient support and counseling	CBIS EHR system Learning and training system Messaging and campaign management system Patient portal

Table 4: Treatment Initiation Barriers and Digital Interventions

	Barrier	Digital interventions to overcome barrier	Example digital health applications*
Access to services	Inadequate geographic coverage of facilities equipped to initiate treatment Fragmented service delivery, increasing likelihood of drop-out Scheduling difficulties preventing timely initiation of treatment	Telehealth support to overcome geographic barriers and fragmentation Digital scheduling	EHR system Telehealth system
Affordability	High out-of-pocket costs for medicines, laboratory tests, and transportation	Digital financial services to facilitate payment or connect with assistance Digital insurance eligibility verification	Insurance management information system Money-transfer platform Pharmacy information system
Supply chain	Inconsistent availability and quality assurance of essential medicines	Digital inventory management systems to track stock levels of medicines and supplies, flag shortages, and automate restocking alerts Health data to support demand forecasting Digital traceability, verification, and regulatory information systems to detect substandard or counterfeit medicines	HMIS LMIS with pharmacovigilance capabilities Pharmacy information system Product catalog
Monitoring, program management, & performance oversight	Incomplete documentation of treatment initiation, completion, and reasons for nontreatment Weak data flow and feedback mechanisms between facilities and PHC providers Limited functionality of health information systems to capture and retrieve timely treatment data Inconsistent monitoring and oversight of medicine availability and quality in public pharmacies	Interoperable individual-level health records to support monitoring and data sharing between levels of care Data sharing from individual-level records to aggregate information systems to inform program management and improvement efforts, including for the supply chain	CBIS EHR system HMIS LMIS

**To deliver expected benefits and address the barriers, applications often require connection to an HIE*

Digital health facilitates team-based care

Digital approaches can help ensure that care teams—from specialists to primary care providers to patients—can access the information they need to move from a diagnosis to treatment initiation. Shared health records play a key role in this. Operating as part of an HIE, shared health records receive and store clinical individual-level information and respond to queries from different point-of-service applications (such as an EHR system or CBIS).

HIE components like product catalogs play an important role in standardizing product identification to improve inventory management. Designing digital approaches to ensure that patients and providers have the tools and information they need to collaborate on turning a diagnosis into an actionable, trusted treatment plan can make care more person centered and effective.

Health Promotion | Screening | Diagnosis | Initiation | Management

Treatment Maintenance

Maintaining treatment is essential to controlling chronic conditions and preventing complications, but it can be difficult to sustain over the long course of NCD and mental health care. Poor adherence, limited follow-up, and weak patient support systems often undermine continued care. Digital tools such as those listed in **Table 5** can provide patients with the support they need to stay engaged with their treatment.

Box 12: *Helping Young People Stay in Treatment with Digitally Enabled Mental Health Care in Zimbabwe*

Zvandiri, a Zimbabwe-based organization, works to connect children and young people living with HIV with peer counselors to support their care journeys. In 2024, Zvandiri adopted Dimagi's CommCare to improve intervention fidelity, case management, and service coordination, configuring it into what is now known as Zvandiri Connect. The platform integrates real-time decision support, service delivery guidelines, screening tools, and embedded educational materials, such as videos and fact sheets, to enhance quality and continuity of care. In addition to HIV, Zvandiri Connect covers tuberculosis, sexual and reproductive health, mental health, self-care, disability, and cervical cancer, among other intervention areas. The platform enables peer counselors to track service delivery, document referrals for more intensive care, and monitor other critical health interventions. They can set reminders for viral load testing and schedule follow-up visits at PHC facilities or in the community. Peer counselors also use the educational materials on the platform to engage clients, families, and caregivers in understanding care needs to reduce stigma. For the full story, see the **Zvandiri case study A-5**.

Table 5: Treatment Maintenance Barriers and Digital Interventions

	Barrier	Digital interventions to overcome barrier	Example digital health applications*
Care coordination & continuity	HCW unable to access patient monitoring data Continuity of care interrupted by migration, leading to loss of patient records Unclear roles or lack of accountability for patient follow-up	Patient-level data consolidated to track adherence and flag missed visits to HCWs for follow-up Digital team-based care approach facilitating results sharing, results tracking, and follow-up prompts and scheduling	CBIS EHR system
Human resources	Limited diagnostic capacity at the PHC level to detect early signs or complications of NCDs and mental health conditions Shortage of HCWs to monitor progress or adjust treatment plans for chronic conditions Overburdened specialists with limited capacity	Telehealth support to facilitate monitoring and reviews Digital diagnostic and monitoring tools sharing information with clinical decision support tools to facilitate early recognition of complications	CBIS Connected monitoring devices EHR system Telehealth system
Quality of care	Inconsistent adherence to clinical protocols and lack of standardized guidance for monitoring and treatment Insufficient capacity and quality assurance for monitoring, including inaccurate measurements and weak follow-up systems Limited integration of psychosocial, socioeconomic, and adherence support into care, reducing patient adherence and satisfaction	Clinical decision support available to providers to support adherence to clinical guidelines Automatically scheduled follow-up appointments and text reminders Follow-up feedback systems to give patients the opportunity to share feedback on treatment progress	CBIS EHR system Pharmacy information system Patient portal Voice- and text-based chatbot and reminders
Access to services	Distance to and long wait times at health facilities hindering ongoing care and monitoring	Telehealth support for patients who cannot get to facilities	Telehealth system

Table 5: Treatment Maintenance Barriers and Digital Interventions

	Barrier	Digital interventions to overcome barrier	Example digital health applications*
Patient knowledge, motivation, & empowerment	Limited patient understanding of their condition, treatment plan, and the importance of continued management Insufficient support for self-monitoring, medication adherence, and maintenance of healthy behaviors Concerns, misconceptions, or low confidence related to medicines and treatment safety Limited awareness and stigma related to mental health conditions that reduce willingness to seek care and maintain treatment	Digital team-based care approach supporting individuals to remain engaged in treatment, with HCWs receiving follow-up flags for patients to address needs as they arise Digital education and counseling tools to support patients Telehealth systems to connect patients with providers and address concerns with treatment Health care providers educated to give patient counseling and support, tailored to local contexts	→ CBIS → EHR system → Learning and training system → Messaging and campaign management system → Telehealth system → Voice- and text-based chatbot
Affordability	Cost of travel, testing, medication, and laboratory tests Inability to pay for recurrent care costs	Telehealth appointments to reduce travel needs Digital eligibility verification for health insurance Digital payments	→ Insurance management information system → Money-transfer platform → Telehealth system
Supply chain	Limited availability of needed medication and monitoring supplies	Improved use of information and resources to optimize supply chain management	→ LMIS
Monitoring, program management, & performance oversight	Limited availability and quality of data at the PHC level for tracking patient outcomes, repeat visits, and treatment progress, hindering ability to predict needs and improve programs	Patient-level data consolidated to provide aggregate information used for analytics and program management	→ EHR system → HMIS → Pharmacy information system

**To deliver expected benefits and address the barriers, applications often require connection to an HIE*

Digital health can anchor NCD and mental health care in PHC

Digital interventions alone are unlikely to drive improvements in treatment maintenance. For treatment maintenance to succeed, patients must be able to access affordable support close to home. Anchoring NCD and mental health care in PHC makes this possible. Once that policy decision is made, digital interventions—connected through an HIE—can ensure that care teams, including specialists, PHC providers, and patients, have the information and support they need to pursue improved outcomes.

Health Promotion | Screening | Diagnosis | Initiation | Maintenance

Long-Term Management

Long-term management supports individuals living with NCDs and mental health conditions over the course of their lives, encompassing comorbidity management, rehabilitation, and when needed, palliative care. Aging populations across the world struggle with NCDs and mental health, facing complex care needs because of their increased risk of frailty, multimorbidity, and polypharmacy.[25] Long-term management is often hindered by challenges such as fragmented service delivery, insufficient integration across levels of care, and limited systems to monitor evolving patient needs. The digital interventions listed in **Table 6** can help address these challenges.

Box 13: *Supporting Long-Term Management for NCDs Through Digitally Enabled PHC at the Community Level in Kenya* In Kenya, community health promoters (CHPs) use the nationally scaled electronic community health information system (eCHIS) to support integrated health service delivery, including for hypertension, diabetes, mental health, malaria, pneumonia, diarrhea, malnutrition, cancer, maternal health, and community event-based surveillance strengthening. eCHIS supports CHPs with guided screening to assess NCD risks as well as decision support to identify and interpret symptoms, signs, and equipment readings. It also helps CHPs plan posttreatment follow-up care and reminds CHPs to check in with patients who were referred to a health facility to confirm that they received further care, closing referral loops. CHPs can continue to monitor and support patients for adherence and link them to care in case of adverse events. By helping CHPs support individuals in their communities, eCHIS enables ongoing long-term management of chronic conditions. For the full story, see the **eCHIS case study A-1**.

Table 6: Long-Term Management Barriers and Digital Interventions

	Barrier	Digital interventions to overcome barrier	Example digital health applications*
Care coordination & continuity	Lack of communication between PHC providers and specialists, especially for people living with comorbidities, leading to duplicative services and conflicting treatment guidance	Digital team-based care approach, providing a holistic patient history Clinical decision support tools for integrated care and appropriate referrals	CBIS EHR system
Human resources	Limited training in integrated, multidisciplinary care Limited integration of chronic care into community-level service delivery	E-learning for skill building Supportive supervision with more experienced health care providers Chronic care monitoring incorporated into CHW workflows Workflow prompts and clinical decision support to support integrated care	CBIS Digital learning and training system EHR system
Quality of care	Irregular monitoring and late recognition of symptom escalation Conflicting guidelines across comorbidities and polypharmacy risks Poor patient experience	Patient/caregiver symptom reporting with triage and teleconsultations In-workflow job aids for multimorbidity, medication reconciliation, and interaction checks Patient feedback mechanisms	EHR system Patient portal Pharmacy information system Telehealth system
Patient knowledge, motivation, & empowerment	Insufficient patient empowerment to self-manage Limited availability of home-based services to support long-term management	Reminders and coaching Connected devices for monitoring and tracking	CBIS Telehealth system Voice- and text-based chatbot and reminders
Access to services	Services offered at disparate locations, especially for those managing comorbidities	Telehealth and community-based follow-ups	CBIS Telehealth system

Table 6: Long-Term Management Barriers and Digital Interventions

	Barrier	Digital interventions to overcome barrier	Example digital health applications*
Affordability	Financial barrier for rehab sessions, assistive devices, and continued treatment support Unaffordable recurrent costs	Digital eligibility verification and benefits mapping E-vouchers	Insurance management information system Money-transfer platform Pharmacy information system
Supply chain	Limited medication availability	Improved inventory visibility and ordering Demand forecasting	HMIS LMIS
Monitoring, program management, & performance oversight	Limited data collection on outcomes, with data not used for improved management and service delivery Fragmented data across multiple conditions and providers	Simple dashboards for outcomes tracking Interoperable longitudinal health records	CBIS EHR HMIS NCD and mental health registries
Intersectoral & community collaboration	Lack of an integrated approach to address patients' needs beyond the health sector Caregivers burdened and unsupported	Intersectoral data sharing, referrals, and social services mapping to support coordinated care plans that can include social protection, housing, or food Caregiver coaching and peer groups via chat text and voice-based chat	CBIS Digital learning and training system HMIS Messaging and campaign management system Voice- and text-based chatbot

**To deliver expected benefits and address the barriers, applications often require connection to an HIE*

Collect once, use many times: reuse patient-level data for system-level improvements

Many of the digital interventions described in Table 6 leverage an HIE to use an individual's data across time and geographies to improve their care. Digital approaches can support reuse of data for care improvements not just at the individual level but also at the system level. Data collected at the patient level can be aggregated and reused for overall health system monitoring, forecasting, and program improvements. This can obviate the need to collect monitoring information separately and improve data quality.

6

NEXT STEPS: PUTTING DIGITAL HEALTH INTO PRACTICE

6 NEXT STEPS: PUTTING DIGITAL HEALTH INTO PRACTICE

This section of the Primer provides high-level, actionable guidance on taking the next steps to deploy digital health for NCD and mental health care.[26]

Assess the Digital Health Enabling Environment

The **digital health enabling environment** comprises seven building blocks: leadership and governance; strategy and investment; services and application; standards and interoperability; infrastructure; legislation, policy and compliance; and workforce.[27] Understanding the enabling environment can help ensure that the right tools are deployed for the right users and avoid costly mistakes. For example, it is important to understand connectivity availability before deploying a telehealth solution or health workforce digital literacy before rolling out new digital tools. A digital health assessment is one way to understand the enabling environment. Most countries have conducted digital health assessments within the past five years, which can be used as a reference.

Because digital health assessments can be costly and time-consuming as well as involve many stakeholders, it is best to **identify if existing assessments can be used before initiating a new one**. There are several kinds of digital health assessments, including digital health maturity and landscaping assessments. Digital health maturity assessments allow governments to benchmark their digital capabilities over time and identify strategic areas for investment. Digital health landscaping assessments focus on identifying the digital technologies deployed in a country. The following tools can be used to evaluate the digital health enabling environment:

- **Digital Health Assessment Toolkit Guide** ↗ (World Bank)
- **Early Stage Digital Health Investment Tool** ↗ (Kati Collective)
- **HIS Stages of Continuous Improvement Toolkit** ↗ (MEASURE Evaluation)
- **Information Systems of Health Toolkit and Assessment Tool** ↗ (WHO)

The **Global Digital Health Monitor** ↗ also provides high-level information on countries' digital health ecosystems and is routinely updated.

Understand Patient Journeys

This Primer shows how patients face barriers as they navigate the care continuum. Understanding the most potent barriers can help identify critical areas for digital interventions. Approaches such as the World Bank's **Patient Pathways Analytics** ↗ can illuminate care bottlenecks, and the methodology can be adapted to find existing digital touchpoints, contributing to landscape analyses.[28]

Identify Digital Interventions to Address Care Continuum Barriers

After uncovering key barriers, identify digital health interventions that can help address them. Use the tables in **Section 5** of this Primer to understand the interventions and applications that can address common problems. Map the technical and functional features required for the applications to address these barriers.

Adapt and Scale

Investigate whether existing digital applications are already deployed that may be adapted and scaled to address the care continuum barriers. This reduces duplication of effort and systems and minimizes data fragmentation. Existing tools that focus on one disease area can often be modified by adding a module or workflow to support additional health focus areas. For an example, see the GoT-HOMIS case study A-2. Digital health assessments can provide valuable information on deployed tools that can be adapted and expanded to support NCDs and mental health.

The **Digital Health Atlas** ↗ also can help identify currently deployed tools. **Modifying existing tools** is often the best way to **deploy and achieve scale quickly** and can reduce training time and costs because users are already familiar with the system. When a system that can be modified to address the needed use cases is not already in place, consider deploying an **existing open source solution** that can be adapted to provide the required interventions.

To learn more about open source tools, refer to the **Digital Square Global Goods Guidebook** ↗ and the **Digital Public Goods Registry** ↗.[29] Consider the following when deploying new tools:

- Ensure that digital systems align with the **national health strategy, national digital health strategy**, and **national digital health architecture**.
- Ensure that tools are **appropriate for the digital health enabling environment** and are built to grow as the environment evolves.
- **Use open standards** such as FHIR to address interoperability, efficiency, and data quality issues. Open standards also enable private sector actors to share information and contribute to the digital health ecosystem.
- **Engage local developers and technologists** to support tool adaptationor development to ensure that local expertise is available for maintaining the system.
- **Prioritize user-centered design**. Developing user personas and scenarios can highlight the needs of HCWs, patients, and other actors within the health system and ensure that workflows address these needs.
- Make sure that **budget and technical support** will be available for ongoing solution maintenance.

Ensure Data Privacy and Security

Protecting health data is fundamental to maintaining trust between individuals and the health system. Strong privacy and security measures safeguard sensitive information, prevent misuse, and reduce the risk of data breaches. Because of the sensitive nature of health data, particularly mental health data, stakeholders need to ensure robust data governance, set policies, and choose a systems architecture that protects confidentiality and maintains trust. Considerations include the following:

- **Consent model:** Select consent models (dynamic/real time, opt in, opt out) that align with the cultural context, population needs, and legal frameworks. The model should provide meaningful, informed consent that empowers individuals (and caregivers) to control who can access and use their health} data and under what conditions.

- **Consent forms and workflows:** Design consent forms that clearly convey what data are being collected for what purposes, who will have access, and how to modify or withdraw. In more advanced digital health ecosystems, this can evolve into unified consent forms with more granular permissions.
- **Education:** Educate providers and patients on patient rights, consent-approach policies, and regulations for strengthening public understanding and transparency of how health data are collected, shared, and used.
- **Data governance:** Establish strong data governance and policies to manage emergency response, enforce minimum necessary disclosures, and ensure accountability. For mental health, additional technical controls to consider include data labeling and segmentation protocols that flag sensitive data for enhanced safeguards. See **Healthdatagovernance.org ↗** for more information.
- **Legal frameworks:** Anchor data governance approaches within relevant legal frameworks that guide rights, obligations, and protections of health data.
- **Systems architecture:** Digital health systems—including exchange platforms—should uphold consent choices, implement privacy and security protocols, and support interoperability. Through the systems architecture, sensitive information, such as mental and behavioral health data, can be integrated into an individual's longitudinal health record or alternatively federated to and retained at the source but accessible through query. Either approach should include role-based access and permissions, encryption, and audit trails to secure and protect sensitive data.

In addition to the tools listed throughout this section, the following are useful resources when putting digital health into practice:

- **Delivering Primary Care for Non-communicable Diseases: A Compendium Service Delivery Models in Low and Middle-income Countries ↗** (World Bank)
- **Digital Adaptation Kits ↗** (WHO, link to overview)
- **Digital Implementation Investment Guide ↗** (WHO)
- **Digital transformation handbook for primary health care: optimizing person-centred point of service systems ↗** (WHO)
- **Planning National Telemedicine and Health Hotline Services: A Toolkit for Governments ↗** (World Bank)
- **Recommendations on Digital Interventions for Health Systems Strengthening ↗** (WHO)
- **Digital transformation handbook for health supply chain architecture ↗** (WHO)
- **Digital transformation handbook for health product catalogue ↗** (WHO)

Conclusion

This Primer demonstrates how digital health can enable person-centered NCD and mental health care, especially within PHC systems. Maps of common barriers in patient journeys, showing how digital interventions can help overcome those barriers, provide a reference guide for how digital health supports patients across the NCD and mental health care continuum. When implemented in alignment with national strategies and to support scaled data exchange, digital health has the potential to improve team-based and person-centered NCD and mental health care. Harnessing the power of digital health offers a pathway to healthier, more resilient communities where every person receives the care they need.

Citations and Notes

1 Data are from Global Burden of Disease (GBD) Study 2023, "Results: Cause of Death or Injury" (Global Health Data Exchange, Institute for Health Metrics and Evaluation, 2023), https://vizhub.healthdata.org/gbd-results/.

2 "Noncommunicable Diseases," World Health Organization, September 25, 2025, https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases.

3 WHO, World Mental Health Today: Latest Data (World Health Organization, 2025), https://www.who.int/publications/i/item/9789240113817.

4 See Delivering Primary Care for Non-communicable Diseases: A Compendium of Service Delivery Models in Low and Middle-income Countries (World Bank, 2025) and Service Delivery Models for Chronic Care in Bangladesh (World Bank, 2022) for examples of digitally enabled care models that anchor NCD care in PHC.

5 WHO, Digital Implementation Investment Guide (DIIG): Integrating Digital Interventions into Health Programmes (World Health Organization, 2020), https://www.who.int/publications/i/item/9789240010567.

6 HL7 FHIR is an open-standard specification that defines how health care information can be represented and exchanged. It supports modern web technologies such as REST APIs and JSON, thus making FHIR easier to adopt by modern technology stacks (for more information, see https://www.hl7.org/FHIR/).

7 WHO, Classification of Digital Interventions, Services, and Applications in Health: A Shared Language to Describe the Uses of Digital Technology for Health, Second Edition (World Health Organization, 2023), https://www.who.int/publications/i/item/9789240081949.

8 Primordial prevention is often considered the first level of prevention and refers to addressing population-level risk factors by addressing social and environmental conditions, often through laws and national policy. Although primordial prevention strategies can have profound health impacts, they typically require long-term, cross-sectoral action on the broader social determinants of health. This Primer focuses on interventions that can be deployed in the nearer term to strengthen service delivery and directly engage individuals—whether through the health system or complementary channels—to improve NCD and mental health care and outcomes.

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10 Nicole Fraser-Hurt, Shuo Zhang, Dayo Carol Obure, Leausa Take Naseri, Robert Thomsen, Victoria Ieremia-Faasili, and Athena Matalavea, Care for Hypertension and Other Chronic Conditions in Samoa: Understanding the Bottlenecks and Closing the Implementation Gaps (World Bank, n.d.), https://openknowledge.worldbank.org/bitstreams/53de4f7f-391b-55ef-912a-aabcc29160ee/download; World Bank, Hypertension and Type-2 Diabetes in Bangladesh: Continuum of Care Assessment and Opportunities for Action (World Bank, 2019), https://hdl.handle.net/10986/33176; Feng Zhao, Nicole Fraser, Olga Khan, Olena Doroshenko, and Laura Poole, "NCD Care Continuum and Opportunities for Action Within Health Reform in Ukraine," Discussion Paper (World Bank, December 2020), https://openknowledge.worldbank.org/server/api/core/bitstreams/e96f1887-4bd5-5bc4-8158-22899c60c3e5/content; Behnaz Bonyadian Dehkordi, Aldrica Xysta Edmund, Elizabeth Lauren Hentschel, Alyssa Safiya Khan, Micaela Mussini, and Carolyn J. Shelton, Assessing the Care Cascade for Diabetes and Hypertension in Saint Lucia: Mixed Methods Study Utilizing Qualitative Data from Health Professional and Service Users and Quantitative Data from the Saint Lucia STEPS 2019–20 Survey (World Bank, 2023), http://documents.worldbank.org/curated/en/099070623091075749; World Bank, Identifying Opportunities to Strengthen Service Delivery for Hypertension in Tajikistan (World Bank, 2019), https://openknowledge.worldbank.org/server/api/core/bitstreams/c8614ee2-f757-5c3d-9e39-785751ff2016/content.

11 See **Annex B** for definitions of these domains and how they were developed.

12 NCD Risk Factor Collaboration, "Worldwide Trends in Hypertension Prevalence and Progress in Treatment and Control from 1990 to 2019: A Pooled Analysis of 1201 Population-Representative Studies with 104 Million Participants," The Lancet, 398, no. 10304 (2021), 957–80, https://doi.org/10.1016/s0140-6736(21)01330-1.

13 Larissa Fast and Adele Waugaman, Fighting Ebola with Information: Learning from Data and Information Flows in the West Africa Ebola Response (USAID, 2016), https://www.intrahealth.org/sites/default/files/attachment-files/fightingebolawithinformation.pdf; World Bank, Digital-in-Health: Unlocking the Value for Everyone (World Bank, 2023), https://openknowledge.worldbank.org/handle/10986/40212.

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16 Data reuse can be an important part of using digital health to strengthen health system functions. For more, see **Section 4**.

17 For more on the social determinants of health, see https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1 and https://confluence.hl7.org/spaces/GRAV/pages/91994234/Terminology+Workstream.

18 World Bank, Hypertension and Type 2 Diabetes in Bangladesh; Fraser-Hurt et al., Care for Hypertension and Other Chronic Conditions in Samoa; Bonyadian Dehkordi et al., Assessing the Care Cascade for Diabetes and Hypertension in Saint Lucia; World Bank, Identifying Opportunities to Strengthen Service Delivery for Hypertension in Tajikistan; Zhao et al., "NCD Care Continuum and Opportunities for Action Withing Health Reform in Ukraine."

19 Refer to the "Services and Application Types" section in the Classification of Digital Interventions, Services and Applications in Health (World Health Organization, 2023) for definitions of most referenced digital applications.

20 "More Ways, to Save More Lives, for Less Money: World Health Assembly Adopts More Best Buys to Tackle Noncommunicable Diseases," World Health Organization, May 26, 2023, https://www.who.int/news/item/26-05-2023-more-ways--to-save-more-lives--for-less-money----world-health-assembly-adopts-more-best-buys--to-tackle-noncommunicable-diseases.

21 Note that in this text, electronic health record and electronic medical record can be used interchangeably to refer to a secure, online system that holds information about people's health and clinical care and is managed by health care providers.

22 Note that in the Classification of Digital Interventions, Services and Applications in Health (World Health Organization, 2023), this type of application is referred to generically as a "communication system."

23 WHO, Global Report on Hypertension 2025: High Stakes—Turning Evidence into Action (World Health Organization, 2025), https://www.who.int/publications/i/item/9789240115569.

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25 Alessandro Monaco, Katie Palmer, Alessandra Marengoni, Stefania Maggi, Tarek A. Hassan, and Shanntanu Donde, "Integrated Care for the Management of Ageing-Related Non-Communicable Diseases: Current Gaps and Future Directions," Aging Clinical and Experimental Research, 32, no. 7 (2020), 1353–8, https://doi.org/10.1007/s40520-020-01533-z.

26 For more guidance on implementing digital health interventions, see the Digital Implementation Investment Guide (World Health Organization, 2020) and consult the Principles for Digital Development.

27 WHO and International Telecommunication Union, National eHealth Strategy Toolkit (World Health Organization, 2012), https://www.who.int/publications/i/item/national-ehealth-strategy-toolkit.

28 The Non-Communicable Disease System Assessment Tool for Identifying Priorities for Investment (World Bank, 2024) is another resource for identifying high-impact intervention points.

29 Building bespoke tools can often become more resource intensive than using existing software, and for this reason, it can be a suboptimal approach.

ANNEX A:
CASE STUDIES

ANNEX A CASE STUDIES

The case studies in this section offer real-world examples of how digital applications can support person-centered NCD and mental health care, anchored in PHC. Each case study leverages digital interventions to overcome a variety of care continuum barriers (Table A-1).

Table A-1: *Care Continuum Barriers Addressed in Case Studies*

			— CARE CONTINUUM LOCATION —					
								
No.	**Case study**	**Location**	**Promotion**	**Screening**	**Diagnosis**	**Initiation**	**Maintenance**	**Management**
A-1	*eCHIS*	Kenya	✓	✓	*	*	✓	✓
A-2	*GoT-HOMIS /Diabetes Compass*	Tanzania	✗	✓	✓	✓	✓	✓
A-3	*SLUHIS*	St. Lucia	✗	✓	✓	✓	✓	✓
A-4	*Vitality App (SSM)*	Vietnam	✓	✓	✗	✗	✓	✓
A-5	*Zvandiri*	Zimbabwe	✓	✓	✗	✓	✓	✓
A-6	*mDOC*	Nigeria	✓	✓	✓	✓	✓	✓
A-7	*OpenIMIS*	Nepal	✗	✗	✗	✓	✓	✓
A-8	*ISACare*	Brazil	✗	✗	✓	✓	✓	✓

** Not supported directly on the platform but working to provide data exchange that would support referrals and enable eCHIS to receive record updates from facilities*

CASE STUDY A-1

Addressing Health System Bottlenecks in Kenya with Digitally Enabled, Community-Based NCD Care

The government of Kenya is committed to every citizen's right to health and is strengthening primary health care (PHC) as part of its drive toward universal health coverage (UHC). However, the country faces a shortage of nearly 60,000 health care workers and a growing burden of noncommunicable diseases (NCDs), which account for up to 39% of all deaths.[1] Strengthening PHC to achieve UHC depends on investing in community health workers to improve access, address workforce shortages, and overcome bottlenecks for patients in receiving timely, high-quality NCD care. Leveraging Kenya's network of 107,831 community health promoters (CHPs) provides a powerful opportunity to strengthen NCD services, bringing care closer to where people live.

In 2020, the Kenya Ministry of Health (MOH) assessed the community health landscape and found gaps in the quality of care as well as in data collection and reporting, which were largely paper based. Where digital solutions were used, they were fragmented and uncoordinated.[2] To address these challenges, the MOH worked with multisectoral partners to develop the National Community Health Digitization Strategy (2020–2025), which is anchored in relevant laws and policies, including the health information system policy and the Kenya community health policy (2020–2030).

The government selected the open source Community Health Toolkit—stewarded by Medic and co-created with a global community of health workers, governments, and implementers—to serve as Kenya's electronic Community Health Information System (eCHIS). The eCHIS supports frontline health workers (CHPs and their supervisors) with improving service delivery, performance management, and reporting. Following a collaborative design process and pilot, the MOH and partners rolled out the eCHIS application to all of Kenya's 47 counties and provided CHPs with supplies, including NCD-screening equipment (blood pressure machines, glucometer and glucometer strips, and scales) in addition to other essential health commodities.[3]

The eCHIS enables CHPs to register households for integrated health services, including NCDs (mainly hypertension and diabetes), mental health, malaria, pneumonia, diarrhea, malnutrition, cancer, and maternal health, as well as for strengthening community event-based surveillance. The system gives CHPs the information and tools they need to conduct health education sessions, promote healthy behaviors in the households they support, and strengthen referrals. It also aligns with national clinical guidelines to standardize the quality of care provided across communities.

The eCHIS supports CHPs with guided screenings to assess NCD risks and with decision support to identify and interpret symptoms, signs, and equipment readings. Importantly, eCHIS helps CHPs plan posttreatment follow-up care. Reminders from eCHIS prompt CHPs to check in with patients who were referred to a health facility to confirm that they received further care, closing the referral loop. CHPs can continue to monitor and support patients for adherence in the community and link them back to care in case of adverse events.

As the MOH and partners continue to strengthen eCHIS, they are advancing interoperability with other digital health systems through Kenya's Digital Health Superhighway: the national health information exchange platform designed to connect digital health applications, improve access and use/reuse of health information, and enhance coordination and continuity of care. The MOH is currently testing bidirectional data exchange between eCHIS and approved hospital-based health management information systems through the Superhighway.

This is needed to send digital referrals from CHPs to health facilities and then close the loop by sending information from health facilities back to CHPs.

eCHIS supports individuals with overcoming traditional barriers across levels of care, ranging from health promotion to long-term management, and facilitates continuity for patients. In doing so, eCHIS supports early detection and more timely diagnosis and treatment, improving NCD outcomes. Today, eCHIS has been scaled nationwide, with CHPs visiting and assessing the health status of more than 7 million households. Through eCHIS, more than 9 million people have been screened for diabetes and more than 6 million for hypertension, resulting in referrals for diagnosis and/or treatment for over 130,600 and 300,000 individuals, respectively.[4]

1 James Avoka Asamani, Brendan Kwesiga, Sunny C. Okoroafor, Evalyne Chagina, Joel Gondi, Zeinab Gura et al., "Modelling the Health Labour Market Outlook in Kenya: Supply, Needs and Investment Requirements for Health Workers, 2021–2035," PLOS Global Public Health 5, no. 1 (2025): e0003966, https://doi.org/10.1371/journal.pgph.0003966; Kenya Ministry of Health, National Strategic Plan for the Prevention and Control of Non-communicable Diseases 2021/22–2025/26 (Kenya Ministry of Health, 2021), https://www.iccp-portal.org/sites/default/files/plans/Kenya-Non-Communicable-Disease-NCD-Strategic-Plan-2021-2025.pdf; John Wanyungu, "CHT Community Story—eCHIS Kenya," presentation, posted October 5, 2023, by Medic, YouTube, https://www.youtube.com/watch?v=ub5WnC9F7mQ.

2 Kenya Ministry of Health Division of Community Health Services, National Community Health Digitization Strategy 2020–2025 (Kenya Ministry of Health, 2021), https://www.eahealth.org/sites/www.eahealth.org/files/content/attachments/2021-08-02/eCHIS-Strategy-2020-2025.pdf.

3 "Embracing Digital Health for Health Outcomes at the Community: eCHIS Journey in Kenya," Community Health Units for Universal Health Coverage, May 10, 2024, https://chu4uhc.org/embracing-digital-health-for-health-outcomes-at-the-community-echis-journey-in-kenya/.

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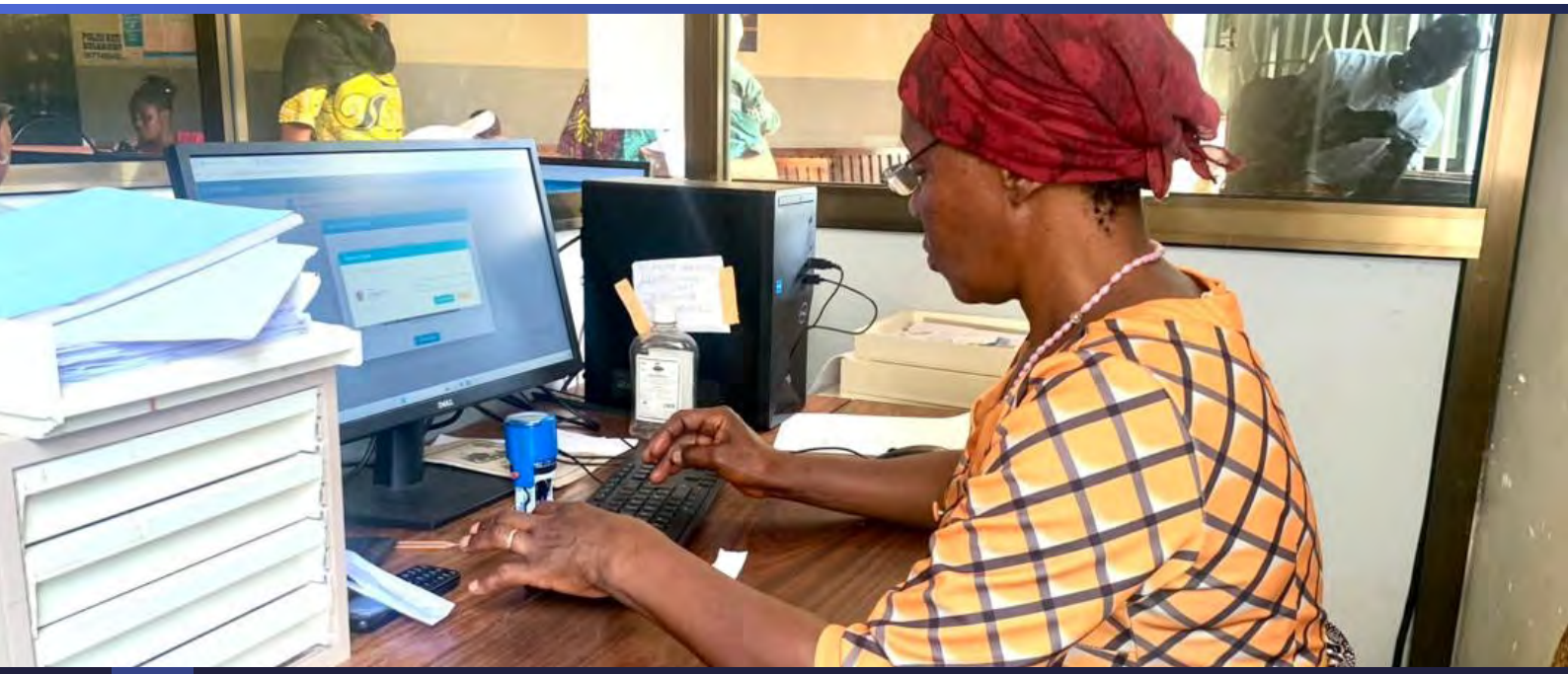


CASE STUDY A-2

Adapt and Scale: How Adding an NCD Module to an Existing System Is Changing Diabetes and Hypertension Care in Tanzania

Across Tanzania's population of 64 million, an estimated one in eight adults is living with diabetes, but more than half of them remain undiagnosed.[1] The rising diabetes burden has prompted national efforts to promote prevention, improve early detection, and strengthen the quality of care.

To advance these goals, the Tanzania Ministry of Health, Community Development, Gender, Elderly, and Children (MOHCDEC) is integrating noncommunicable disease (NCD) care into primary health care (PHC). In collaboration with partners, the MoHCDEC has expanded the nationally scaled electronic medical record system—the **Government of Tanzania Health Operations Management Information System (GoT-HOMIS)** ↗ — to include a dedicated NCD module with diabetes and hypertension workflows. The NCD module was designed under the Diabetes Compass initiative with partners that include the World Diabetes Foundation, the Tanzania President's Office of Regional Administration and Local Government, the MoHCDEC, the Tanzania Diabetes Association, HISP Tanzania, and Muhimbili University of Health and Allied Sciences.[2]

PHC facilities use GoT-HOMIS to capture, manage, and report patient information. It facilitates patient registration, visit management, and clinical documentation; provides information on healthy lifestyles; tracks prescriptions; and generates reports for national monitoring. Core modules include billing, laboratory, pharmacy, outpatient services, inpatient services, HIV, maternal and child health, and the NCD module. The system enables continuity of care by maintaining longitudinal patient records, and it integrates with other national health information systems such as DHIS2, the country's national health management information system, to support data-driven decision-making.

When a patient visits a PHC facility, GoT-HOMIS prompts health care workers to take and record their vitals, including height, weight, blood pressure, blood sugar, and temperature. During the consultation with the health care provider, the patient is screened for diabetes and hypertension. Providers use the NCD module in GoT-HOMIS to guide the screening process and support a diagnosis as well as to update the patient's health record.

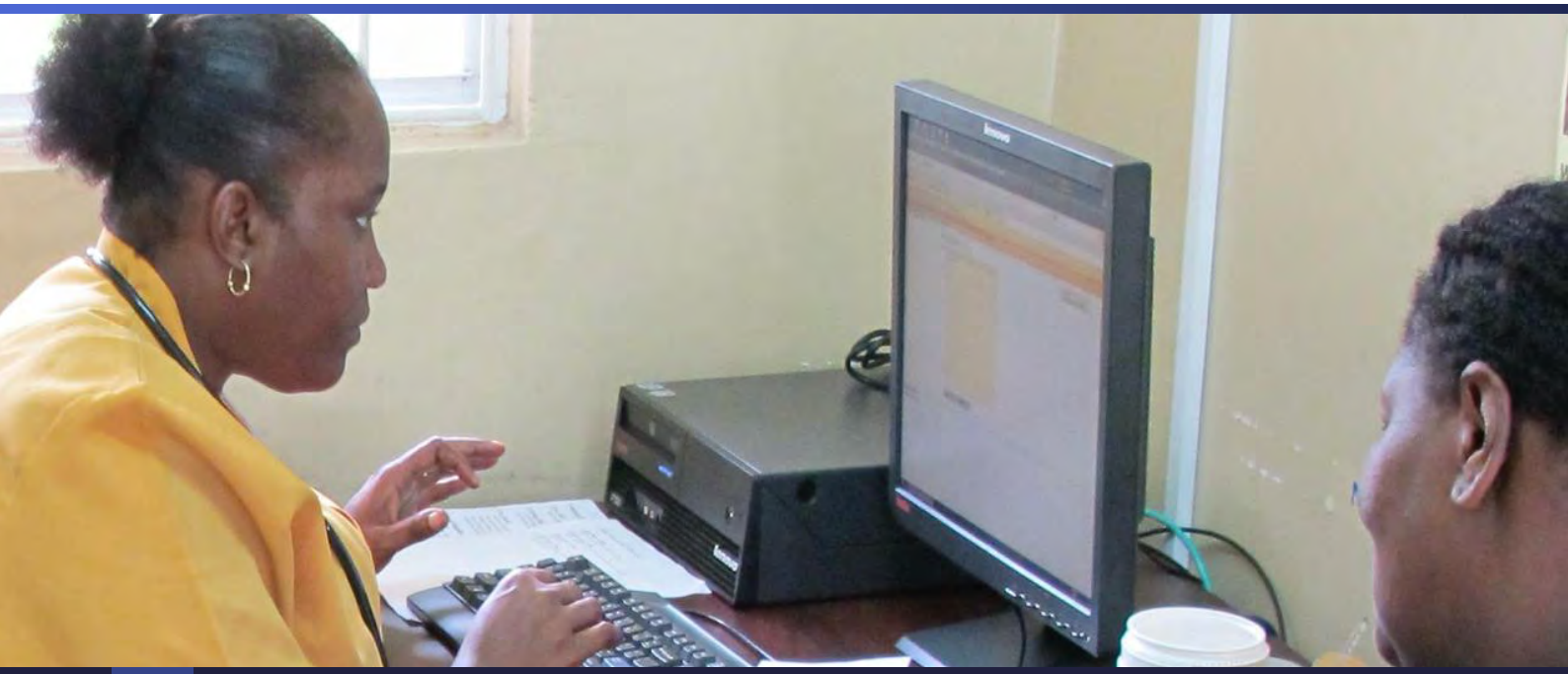
Patients diagnosed with diabetes or hypertension are enrolled in the NCD cohort for long-term treatment and support. The system includes scheduling features that prompt patients to return on designated clinic days for regular monitoring, including blood sugar and blood pressure checks and medication adjustments. All results are recorded in GoT-HOMIS, which provides basic decision support to health care workers by flagging values that require further treatment or counseling. Providers can also access dashboards in the system that show patients' blood pressure and blood sugar levels over time to help them make informed decisions about care. GoT-HOMIS prompts regular screening for complications, including checkups for eye, foot, and kidney health, and patients are referred to secondary and tertiary care as needed.

Because the NCD module was deployed in a solution that was already scaled nationally, the workflow is currently available in 6,000 PHC facilities across the country, achieving rapid scale. Health care workers in eight PHC facilities have been trained on how to use the NCD module effectively, and there are plans to expand training nationwide. Looking ahead, the MoHCDEC plans to build on the initiative and further digitize NCD services at the community level, streamlining referrals across all levels of care (from community to primary and primary to tertiary) and enabling data exchange through the Tanzania Health Enterprise Architecture.

The Diabetes Compass initiative aligns with Tanzania's forthcoming national digital health strategy, which positions digital technologies as key enablers of universal health care. Use of the NCD module in GoT-HOMIS is strengthening NCD care coordination and patient monitoring, driving continued progress toward integrated, person-centered NCD care in Tanzania.

1 Yildiz Arslan, "The Tanzanian Recipe for Impact," World Diabetes Foundation, accessed November 18, 2025, https://www.worlddiabetesfoundation.org/what-we-do/impact-stories-and-reflections/the-tanzanian-recipe-for-impact/.

2 "Our Work in Tanzania," Diabetes Compass, accessed November 21, 2025, https://www.diabetescompass.org/tanzania.



CASE STUDY A-3

Harnessing a National Electronic Medical Record to Advance UHC and NCD Care in Saint Lucia

In Saint Lucia, the epidemiological profile of the population has transitioned from primarily communicable diseases to noncommunicable diseases (NCDs), reflecting broader demographic and lifestyle changes. According to the Ministry of Health, Wellness, and Elderly Affairs (MOHWEA), from 2011 to 2021 the diabetes burden increased by 37.9%, and during the same period, hypertensive heart disease increased by 69.8%. This shift is placing increased demand on the health system for prevention, diagnosis, and long-term management of chronic conditions.

To address these challenges and others, the Government of Saint Lucia is committed to universal health coverage (UHC), ensuring that every resident has access to essential health services. In August 2024, the government established a UHC unit to facilitate implementation of UHC priorities, including strengthening services for hypertension and diabetes in primary health care (PHC). As part of this mandate, an essential package of health services was launched to increase screening and treatment for hypertension and diabetes at PHC facilities. According to the MOHWEA, seventeen out of 34 PHC facilities in the country are participating in the pilot, which provides diabetes and hypertension screening, risk assessments, lab tests, diagnosis, and long-term care services at no cost to patients.

Technology has a critical role to play in reducing health care inequities and making progress toward the country's UHC aims. Since 2011, the MOHWEA has invested in the Saint Lucia Health Information System (SLUHIS), a national electronic medical record (EMR) for registering, collecting, analyzing, visualizing, sharing, and using patient health information in PHC facilities.

When a patient first visits a PHC facility, they receive a unique health ID, which creates a longitudinal record within the system. Using role-based permissions, the system enables care teams to access the minimum health data necessary to coordinate services, deliver care, monitor patients, and make data-informed care decisions.

To support the UHC essential package of health services pilot, several enhancements were made to SLUHIS. FINDRISC (Finnish Diabetes Risk Score) and cardiovascular disease risk calculators were added to help providers predict an individual's likelihood of developing chronic diseases within a certain timeframe, guiding preventive measures, counseling, and follow-up testing. SLUHIS is integrated with the lab information system, enabling clinicians to send lab orders automatically and making it easier to access lab results electronically within the system.

Facilities participating in the pilot received training to strengthen their use of SLUHIS in clinical workflows, enabling providers to track patient status, monitor NCD key performance indicators, and set quarterly goals for their patient populations. The pilot offers financial incentives to PHC facilities to encourage improved data collection and promote a culture of data use and reuse in patient care. Data from SLUHIS are also aggregated and visualized on live dashboards for the MOHWEA and facilities, providing real-time insights into the performance, service utilization, and quality outcomes of pilot facilities.

According to the MOHWEA, early results from the pilot show a 33% increase in utilization of hypertension and diabetes services, accompanied by higher numbers of patients controlled, more individuals screened, and improved quality, accountability, and recordkeeping.[1] Overall, the pilot has increased use of data among health care workers at participating PHC facilities. Now planning is under way to scale the UHC essential package of health services to other PHC facilities. Further SLUHIS enhancements are planned as well, including enabling patient appointments and sending alerts to individuals who are eligible for screening.

To enhance the country's digital health ecosystem, the MOH has outlined in the forthcoming ***Saint Lucia National Digital Health Policy and Strategy (2026–2036)*** plans to develop a health information exchange platform that will enable interoperability between national systems, including the lab information system, the civil registration and vital statistics system, SLUHIS, and the hospital management system. This approach will support access to patient health information across the care continuum, contributing to a more integrated, patient-centered care model that furthers Saint Lucia's UHC goals.

1 "Saint Lucia Health System Strengthening Project," unpublished restructuring paper (World Bank, 2024).

CASE STUDY A-4

Expanding Digital Self-Screening for Hypertension in Vietnam

Stroke and ischemic heart disease are leading causes of death across male and female populations in Vietnam. A major contributor to these conditions is high blood pressure, also known as hypertension, which is one of the most common and preventable risk factors for cardiovascular disease. Despite this, hypertension is uncontrolled in more than 50% of the hypertensive population, and many others in the country go undiagnosed.

In recognition of the need to act on noncommunicable diseases (NCDs), the Ministry of Health (MOH) released its *National Strategy for Prevention of Cancer, Cardiovascular, Diabetes, Chronic Obstructive Pulmonary Disease, Asthma, and Other NCDs, 2015–2025*. Key strategic priorities included strengthened prevention of NCDs and earlier detection, diagnosis, treatment, and long-term management (including self-management) across all levels of health care, down to the commune (community) level. The national strategy aims to detect 50% of people with high blood pressure and control high blood pressure prevalence among adults to below 30%.

Over the years, numerous NCD initiatives have been implemented in Vietnam to improve access to NCD detection and care. One such initiative, the Addressing Cardiometabolic Disease (CMD) Care initiative, leverages a digital platform with applications for both health workers and individuals. Referred to as the Sức Sống Mới (SSM), or New Vitality, the platform builds on previous investments to deliver enhanced functionality.

The direct-to-patient version of the application enables individuals to screen themselves for CMDs by completing a short questionnaire and entering their blood pressure indicators. Following the screening, the application analyzes the patient's risk of CMDs. If the risk is high, the application provides a warning message that recommends a primary health care (PHC) checkup. Health workers are also notified of the patient's status so that they can conduct follow-up. SSM gives the location and contact details for nearby facilities as well as appointment reminders to support treatment adherence and retention in care. Patients can continue to use the platform to monitor CMD-related indicators and access prevention and care guidelines adapted for patient use. Caregivers can also use the application to create and manage accounts for family or community members who have difficulty using smartphones.

The health worker version of the application equips PHC staff and community health workers (CHWs) with health education materials for promotion, prevention, and evidence-based counseling. The case management module helps health care workers identify risks through a 10-year cardiovascular risk calculator, screen patients, link laboratory results (where available), manage referrals, document diagnoses and treatment plans, and conduct home visits.

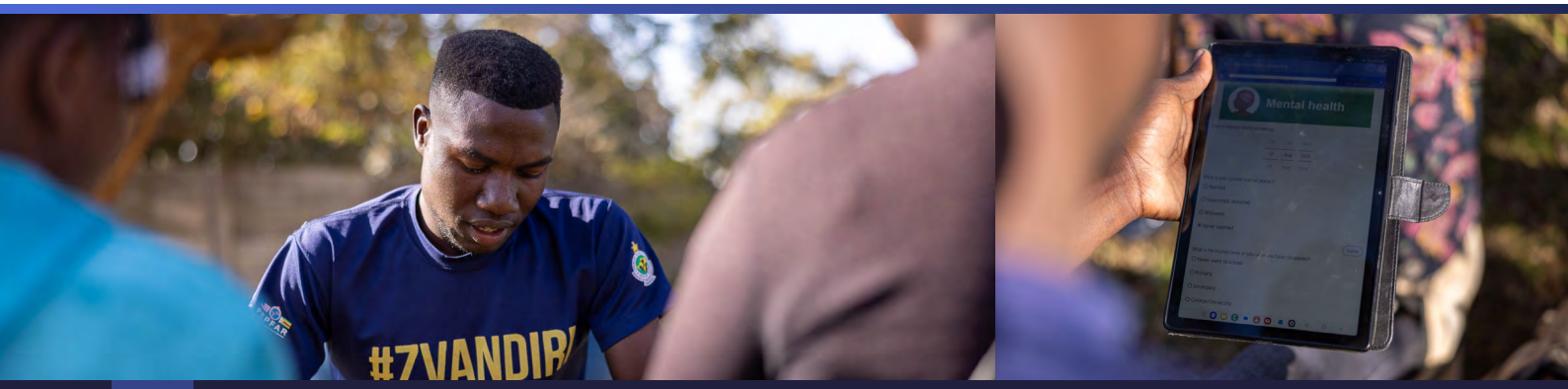
Currently, the SSM platform is interoperable with the national hospital information system and laboratory information system used in PHC facilities. For patients participating in the initiative, CMD-related results in the laboratory information system are automatically shared with the SSM platform. Data exchange between SSM and facility-based electronic medical records is currently being tested, with plans to expand automated reporting to the national health statistics system and the MOH's NCD-reporting database.

According to PATH who has supported implementation of SSM, the platform is used by more than 1,200 health workers (550 PHC workers and 840 CHWs from 32 districts and commune health facilities) and 6,860 people living in the Thai Nguyen province. Plans are under way to scale to other provinces. By facilitating self-care and collaboration among individuals, their care providers, and CHWs, SSM enables team-based care and strengthens health promotion, screening, and treatment maintenance for CMDs.

1 Data for Vietnam, World Health Organization Database, 2024, https://data.who.int/countries/704.

2 Huynh Van Minh, Tran Van Huy, Doan Pham Phuoc Long, and Hoang Anh Tien, "Highlights of the 2022 Vietnamese Society of Hypertension Guidelines for the Diagnosis and Treatment of Arterial Hypertension," The Journal of Clinical Hypertension 24 (2022): 1121–31, https://doi.org/10.1111/jch.14580.

3 Vietnam Ministry of Health, National Strategy Prevention of Cancer, Cardiovascular, Diabetes, Chronic Obstructive Pulmonary Disease, Asthma and Other Non-communicable Diseases, the Period 2015–2025 (International Cancer Control Partnership, 2015), https://www.iccp-portal.org/resources/national-strategy-prevention-cancer-cardiovascular-diabetes-chronic-obstructive-pulmonary.



CASE STUDY A-5

Zvandiri: A Digitally Enabled, Peer-Led Solution to Advance Mental Health Service for Youth Living with HIV in Zimbabwe

More than 80% of people affected by mental health conditions live in low- and middle-income countries, where there are also shortages of trained health workers and access to care is limited.[1] A strong interconnection between mental health and HIV exacerbates this challenge, affecting HIV treatment adherence and viral suppression and increasing mortality rates.[2] In Zimbabwe, where one in eight people is living with HIV, research shows that they face a significantly higher risk of depression and anxiety compared to those who are HIV negative (67.9% versus 51.4%).[3] National efforts are under way to strengthen mental health care, including integration into primary health care (PHC) as outlined in the *Mental Health Strategy*.[4] Yet mental health remains severely underfunded, receiving only 0.42% of the Ministry of Health and Child Care's budget, and it continues to be a highly stigmatized topic because of widespread misconceptions and limited public awareness.[5]

Zvandiri ↗, a Zimbabwe-based organization, is working to strengthen community mental health services for children, adolescents, and young adults living with HIV. Through a peer-led service model, Zvandiri trains young people living with HIV (ages 18–24) to provide information, counseling, and psychosocial support to their peers. Peer counselors with lived experience help fill gaps in the mental health workforce, destigmatizing HIV among peers and providing clients with therapy to address feelings of loneliness and isolation.

In 2024, Zvandiri adopted **Dimagi's CommCare** ↗ solution to strengthen case management and service coordination, configuring it into what is now known as Zvandiri Connect. Previously, a mix of paper-based tools and a separate reporting system limited effective case management, preventing peer counselors from timely identification of risks and delivery of services. Zvandiri Connect is a mobile counseling, case management, and data collection digital platform used by peer counselors and health facility teams to track and deliver services to young people living with HIV. The platform integrates real-time decision support, service delivery guidelines, screening tools, and embedded educational materials, such as videos and fact sheets, to enhance quality, implementation fidelity, and continuity of care. In addition to mental health, Zvandiri Connect covers tuberculosis, sexually transmitted infections, substance use, self-care, safety (including counseling and screening for sexual violence), sexual and reproductive health, elimination of vertical transmission of HIV, disability, and cervical cancer.

At PHC facilities and in communities, peer counselors use Zvandiri Connect to register young people living with HIV for Zvandiri program support, which includes providing information on mental health; screening for common mental health conditions, such as depression, anxiety, substance use, trauma, and suicidal ideation; giving peer support; and linking to health services as needed.[6] The platform enables peer counselors to track service delivery, document

referrals for more intensive mental health care, and monitor other critical health interventions. They can set reminders for viral load testing and schedule follow-up visits at a PHC facility or in the community. Peer counselors also use the educational materials on the platform to engage clients, families, and caregivers in understanding mental health needs and to reduce stigma. After patients age out of the program, they continue to receive routine HIV treatment and care provided by health care workers at PHC facilities.

Zvandiri Connect is currently a stand-alone platform, but there are plans to integrate it with the Ministry of Health and Child Care's national health information systems (DHIS2) to enable access to real-time data on community-level, peer-delivered services. The organization is also planning to strengthen support for its peer counselors through CATSCoach, a chatbot powered by Dimagi's Open Chat Studio that serves as a virtual mentor, offering ongoing supervision and training via WhatsApp. CATSCoach has successfully undergone a pilot phase and is now ready to roll out.[7]

According to Zvandiri, the initiative has scaled to 46 of 63 districts across Zimbabwe, 43 of which are using Zvandiri Connect. The model supports around 50,000 clients through a network of 972 peer counselors and 479 PHC facilities. The Zvandiri peer-led model helps foster trust and motivation among clients, which in turn has been shown to improve their mental health, adherence to HIV treatment, and viral suppression. Two randomized trials demonstrated a 42% decrease in treatment failure and reduced mortality and a 60% reduction in depression symptoms among adolescents participating in Zvandiri.[8] Investing in a tech-enabled, empowered youth workforce provides an inclusive and effective way to address mental health care gaps among young people living with HIV in Zimbabwe.

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7 CATSCoach uses the World Health Organization's EQUIP (Ensuring Quality in Psychological Support) competency-based approach for standard peer counselor training.

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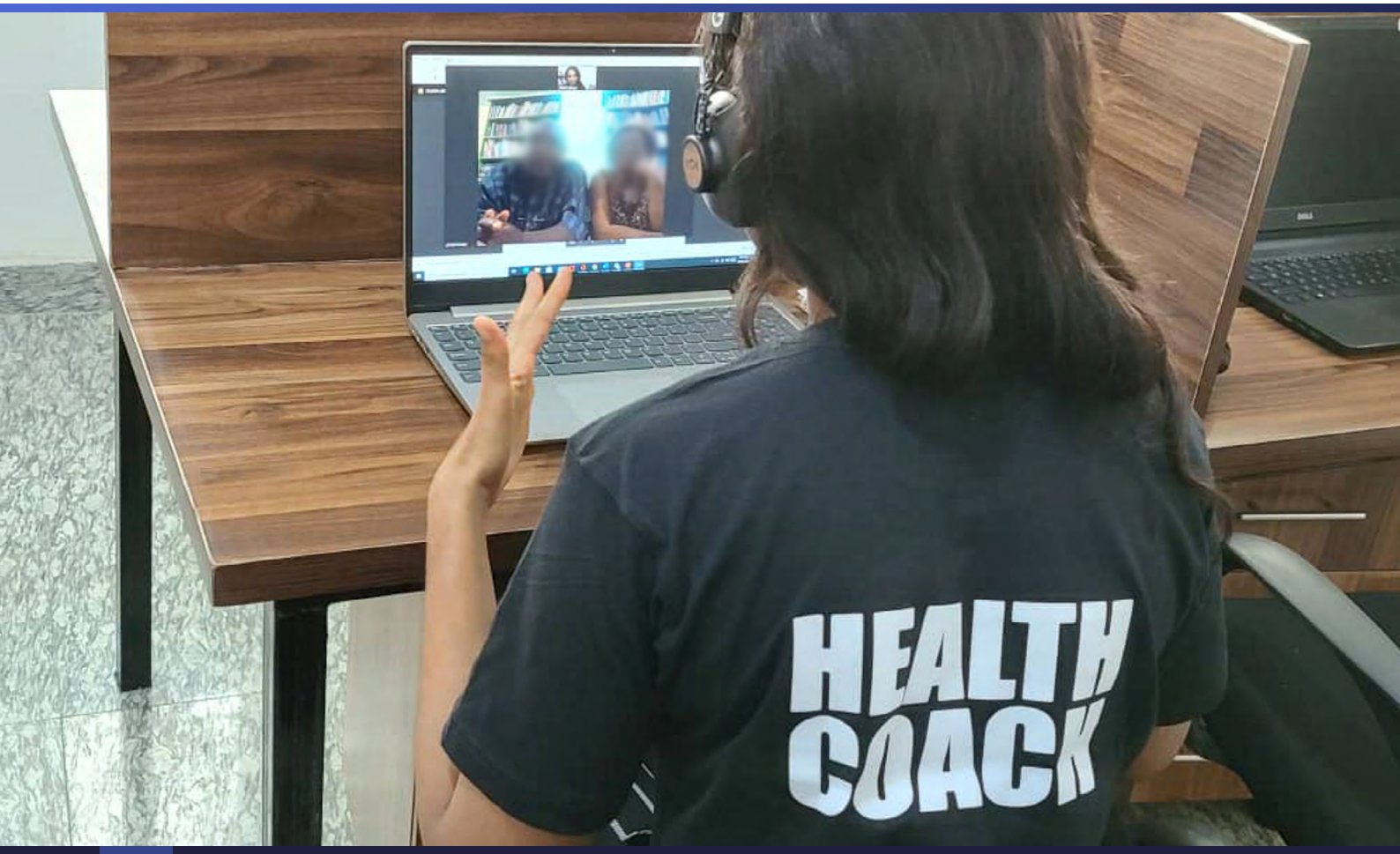

CASE STUDY A-6

Empowering Individuals to Manage Their NCD Care with mDoc in Nigeria

With nearly one in three deaths in Nigeria linked to noncommunicable diseases (NCDs), self-care and digital patient-engagement tools offer promising ways to advance patient-centered care.[1] These approaches can extend support beyond the walls of a physical clinic, improving access and potentially reducing strain on a country's health system.

mDoc ↗ is a private sector solution aimed at bringing NCD care closer to patients in Nigeria. Launched in Lagos in 2016, mDoc integrates physical and digital services to meet members where they are, providing self-care support for people living with or at risk of chronic conditions such as hypertension, diabetes, obesity, cancer, anxiety, and depression. Services include an omnichannel coach-led platform called CompleteHealth, in-person tech-enabled sites called NudgeHubs, a patient navigation platform called NaviHealth.ai, and capacity building for health care workers, policy makers, leaders, and other groups through the mDoc Quality Network (MQN). These services complement facility-based care and combine data, technology, behavioral science, and quality improvement methodologies to support members with adopting lifestyle modifications and managing their health, empowering them to live healthier and more fulfilled lives.[2]

Through the CompleteHealth platform, members can engage with Kem, an AI health coach, as well as access primary health coaches and a multidisciplinary team of experts (fitness, nutrition, and emotional wellness) for personalized guidance. Kem serves as the first line of support, escalating cases to a human health coach for more personalized assistance who, in turn, refers members to PHC facilities for follow-up care when needed (e.g., lab

tests, eye care). With support from experts and health coaches, members can access timely care, track their health status, and build digital literacy and self-efficacy. Members pay for services through a tiered pricing model, which offers varying levels of engagement tailored to health needs.

Based on each member's health profile and NCD status, mDoc helps members set personal health goals; offers nutrition, fitness, and emotional wellness guidance; monitors medication adherence; and provides access to educational sessions and community support groups. Coaches and members use mDoc's platform to work together using a patient-centered approach to track key health metrics within the platform. Access to evidence-based interventions for diabetes, hypertension, obesity, cancer, anxiety, and depression empowers members to manage their health information, make informed lifestyle choices, and support their emotional well-being.

mDoc services are also accessible through in-person, physical spaces called NudgeHubs, where people can walk in, enroll, and meet with a health coach for baseline and follow-up health assessments and coaching services. In these spaces, members can work with coaches to co-create health goals, participate in exercise classes, and receive health and digital literacy support. Community Ambassadors work in the community as part of NudgeHubs, extending care into homes and markets by building trusted relationships through health promotion and education (e.g., how to measure blood pressure and blood glucose). Individuals can self-register and use the mDoc platforms independently, but where they do not have access to a device and/or the internet, NudgeHubs provide an alternative. Currently, there are five NudgeHubs in Lagos State, and plans are under way for expansion.

To support patient navigation, mDoc provides a geo-coded directory of health facilities, services, and providers in Nigeria called NaviHealth.ai. It leverages the Federal Ministry of Health's National Health Facility Registry and National Health Workforce Registry as data sources, among others.[3] This helps members find additional health services and allows them to give reviews and feedback on their experiences with providers and facilities along the quality-of-care domains. mDoc is also partnering with the Lagos State Primary Healthcare Board on a quality care metric dashboard to assess safety, timeliness, patient-centeredness, effectiveness, equity, privacy, and confidentiality.

mDOC has reached more than 150,000 members, and there are plans to continue scaling it across Nigeria, Ghana, Kenya, South Africa, and other countries to empower individuals to take charge of their health and wellness. Research conducted by mDoc indicates that members with hypertension and diabetes achieve statistically significant reductions in blood pressure and fasting blood glucose levels.[4] mDoc's work in Nigeria illustrates a private sector, person-centered approach to improving NCD and mental health care, empowering people with the support they need to address chronic conditions and make lifestyle changes.

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CASE STUDY A-7

Digital Tools Powering Social Health Insurance for NCD Prevention and Treatment in Nepal

Social health insurance programs can provide a critical safety net for vulnerable populations that face financial hardship and cannot afford health expenses. In Nepal, where patients shoulder 56% of their health care expenses out of pocket, social health insurance plays a vital role in enabling care and advancing universal health coverage (UHC).[1] This is especially true when it comes to NCD care, which can be a significant contributor to catastrophic health expenditures.[2]

The Government of Nepal took a key step toward UHC in 2017 with the introduction of the Health Insurance Act, which mandates that every citizen be covered by a social health insurance scheme.[3] It then established the Health Insurance Board of Nepal, an autonomous government entity charged with managing the National Social Health Insurance (NSHI) scheme, in areas ranging from beneficiary enrollment to claims adjudication. The country's UHC aspirations are further defined in a series of policy and strategy documents, including the *National Health Sector Plan 2023–2030*, the *National Health Financing Strategy 2023–2030*, and the *National Health Insurance Strategic Roadmap 2023–2027*. Funding is through a blend of beneficiary contributions, government subsidies, loans, and grants.

A small claims management team at the Health Insurance Board processes up to 80,000 claims from health facilities a day, with diabetes and hypertension representing the largest number of claims.[4] Recognizing the need to digitally manage complex business operations, the Board adopted **openIMIS ↗**, a software solution that supports the administration and management of insurance programs on a single platform. Key platform features include enrollment, beneficiary management, policy management, claims adjudication, facility payment portal, and data analytics.

openIMIS makes it easier for patients to access their health benefits. The solution streamlines the enrollment process with easy registration and identity verification, accelerating administrative processes to improve patient-centered care. The platform includes an Android app that enables community enrollment assistants to conduct door-to-door outreach and registration. Families can also self-register using the app and use mobile wallets for payment. At a cost of NPR 3,500 per year, a family of up to five can enroll in the scheme and receive health services up to NPR 100,000. Additional family members can be added for NPR 700 per person.[5] For individuals and families living below the poverty line, the contribution is fully subsidized by the local government, and the 20% copayment per health visit is waived.

Upon enrollment, families are given an insurance card with a QR code, which enables cashless access to services. Families are also required to select a primary care provider as their first point of access to care. By directing beneficiaries to primary care clinics, NSHI can ease pressure on higher-level health facilities and help reduce delays in care. The NSHI benefits package includes promotive, preventive, and curative services, which are vital components of the NCD care cascade. Families can also access their beneficiary profiles to monitor the status of claims, review their benefits packages, and renew their policies.

Primary care facilities participating in NSHI use openIMIS to verify enrollment and benefits at the point of service and submit claims for reimbursement. Claims can be submitted through an openIMIS web-based portal or directly from a facility electronic medical record to openIMIS using government-defined standards (Health Level Seven Fast Healthcare Interoperability Resources APIs).

Today, Nepal's NSHI operates in all 77 districts, at 484 health facilities with 9.2 billion beneficiaries.[6] Using digital approaches to manage social health insurance schemes streamlines health-financing operations, enables timely reimbursements for primary health care facilities, and most important, provides access to financial protection, which is critical for people managing NCDs and other long-term conditions.

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CASE STUDY A-8

Bringing Tech-Enabled Home Health Care to Brazil

Brazil's health care system has made significant gains in recent years, accounting for 9.4% of GDP, but individuals still face barriers to care, including unequal access to services, long wait times, workforce shortages, and fragmented care coordination.[1] The impact is acutely felt in the prevention, detection, and long-term management of noncommunicable diseases (NCDs). In Brazil, NCDs account for 76% of deaths, and the current trajectory shows the country is at risk of falling short on commitments to reduce NCD mortality by one-third by 2030.[2]

During the COVID-19 pandemic, federal guidelines in Brazil encouraged primary health care (PHC) teams to support patients with safely managing care at home.[3] This shift created growing demand to expand private sector offerings for home health services for chronic conditions, such as diabetes, hypertension, COPD, and other areas of care like oncology. These services can ease the pressure that the NCD burden places on the health system while improving patient outcomes and experiences. With the acceleration of the home health market, several innovative companies have emerged to support a more patient-centered model of care. One such company, **ISA Saúde ↗**, is delivering skilled nursing and health services to patients in their home using a digital platform to coordinate, deliver, and monitor care.

ISA Saúde's home health service—ISACare—offered remote COVID-19 tests initially. It has since evolved to provide hospital-level medical care at home, ranging from routine services such as blood testing to complex treatments like rehabilitation and palliative care. Patients are typically referred to ISACare by their health insurance provider for home care because of high emergency room usage or when they have an acute health event, such as a heart attack. The service is powered by a digital platform with an integrated electronic medical record (EMR) that enables care teams across the ISACare network to coordinate care and access clinical guidelines as well as to use and update patients' health records in real time during telehealth consultations and home visits. After a patient is enrolled, a nurse visits the patient's home to assess vital signs. Then, team-based care is provided to address the patient's specific needs, ranging from acute care to long-term chronic disease management.
Care teams are equipped to treat multiple conditions and effectively manage comorbidities, with coordination facilitated through the EMR.

Using a patient-facing portal, patients and caregivers can access their health records, schedule appointments, and manage their health, such as monitoring blood pressure and blood glucose levels. Prompted by push notifications and WhatsApp reminders, patients can even input their own health data, such as temperature or blood pressure. The data are reviewed by care teams to support ongoing, home-based monitoring.

To enhance provider workflows in the EMR, ISACare is piloting the use of AI and connected diagnostics. Generative AI algorithms help providers query patient records and access internal standard operating procedures. AI also alerts providers to patients with deteriorating vitals and other clinical risks that require immediate follow-up. The connected diagnostics pilot is testing the use of blood pressure monitors, glucose meters, and oximeters, which auto-populate patient records for automated monitoring.

Patients retain access to their personal health records through the ISACare app, even if they no longer receive ISACare services, empowering them as they navigate the care system. ISACare's digital platform also leverages common health data standards and exchange data with some of the country's largest EMRs using application programming interfaces (APIs), which supports care continuity. This approach contributes to Brazil's national

digital health priorities to accelerate use of EMRs and enable data sharing as outlined in the country's *Digital Health Strategy 2020–2028* [4] and plans for the National Health Data Network.[5]

ISACare services are paid for by private sector insurance as well as individuals who pay out of pocket. Through partnerships with insurance companies, ISACare is working to lower health care costs, minimize fraud, waste, and abuse, and improve health outcomes. In addition, ISA Saúde secured a $30 million[6] Series B equity investment, including $15 million from the International Finance Corporation, the private sector arm of the World Bank.[7] This investment supports the company's expansion, which already spans 69 cities and serves 1,500 patients daily, further advancing competition and digital innovation.

By integrating technology with home health services, ISA Saúde is reducing reliance on hospital-based care, lowering costs, improving NCD management with team-based care, and enhancing both access and efficiency, all while delivering a better patient-centered experience.

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6 All dollar amounts are US dollars.

7 "ISA Lab," IFC Project Information & Data Portal, International Finance Corporation, World Bank, updated August 29, 2025, https://disclosures.ifc.org/project-detail/SII/51132/isa-lab.

B

ANNEX B: BARRIER DOMAIN METHODOLOGY

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This Primer presents a framework of nine domains that categorize the types of barriers stakeholders experience in NCD and mental health care. To develop these categories, data on barriers were extracted from care continuum analyses conducted in Bangladesh, Samoa, Saint Lucia, Tajikistan, and Ukraine. A total of 185 barriers across the care continuum were extracted from these analyses.

Once all barriers were extracted, they were categorized by whether digital approaches could help address the challenge. Each barrier was qualitatively reviewed and coded using a combination of rule-based text analysis and expert judgment. A barrier was coded as "digitally addressable" when a plausible digital health intervention could help address a significant component of the challenge. It was coded as "not digitally addressable" when digital approaches were unlikely to contribute substantially to overcoming the barrier. A total of 133 barriers were coded as digitally addressable out of the 185 extracted.

The barriers that were labeled as digitally addressable were iteratively analyzed, and the barrier themes were extracted and adjusted to best represent the types of challenges that stakeholders faced. The final nine barriers, their operational definitions, and examples of the barriers that were categorized under the respective domains are provided in Table B-1.

Table B-1: Definitions and examples of Barrier Domains

Domain	Definition	Representative examples
Care coordination & continuity	Fragmented or poorly connected care pathways; weak linkages between steps of the care continuum; poor referral or counter-referral systems; lack of follow-up for patients that interrupts treatment; limited communication between providers.	*"It is difficult to track the connection between screening and diagnostics."*
		"Weak follow-up to ensure patients successfully initiated treatment"
Human resources	Workforce shortages, limited skills, or unclear responsibilities that constrain service delivery; includes inadequate supervision or training for NCD management.	*"Lack of equipment and health workers"*
		"Low capacity and focus to address hypertension at PHC levels"
Quality of care	Deficiencies in accuracy, completeness, or consistency of care processes, such as poor diagnostic accuracy, lack of standardized protocols, or suboptimal prescribing; includes patient-perceived quality relating to respect, confidentiality, and trust.	*"Insufficient skills for effective communication about healthy lifestyle"*
		"Irregular blood pressure monitoring"
		"Lack of guidelines for screening integration into PHC"

Table B-1: Definitions and examples of Barrier Domains

Domain	Definition	Representative examples
Patient knowledge, motivation, & empowerment	Gaps in patients' understanding, motivation, or ability to engage in care or self-management, including low health literacy, adherence issues, fear, stigma, misconceptions, and limited self-care capacity.	*"Gaps in understanding of disease among people living with hypertension"* *"Lack of patient capacity to self-monitor"* *"Limited patient understanding of the importance of diet and exercise"*
Access to services	Barriers related to physical or organizational accessibility of care, such as distance, long waiting times, or irregular service availability.	*"Difficult to go from facility to facility for tests"* *"Time and distance costs to visit the facility"* *"Long waiting times at health facilities"*
Affordability	Costs that hinder access to and delivery of care.	*"Do not perform diagnostics because of high costs"* *"Time and distance costs to visit the facility"* *"Awareness of future treatment costs"*
Supply chain	Problems with commodity and equipment availability or distribution, including stockouts, delays, cold chain management, or inadequate forecasting of supplies.	*"Inadequate access to medication in public pharmacies"* *"Uncertainty with drugs availability"* *"Failing to obtain drugs due to stockouts"*
Monitoring, program management, & performance oversight	Barriers related to the systems, processes, and data required to monitor and manage service delivery and performance, including data quality, tracking systems, and data for decision-making and program improvement.	*"Lack of information on number of patients to predict amount of care needed"* *"Accurate estimates of hypertension prevalence are lacking."* *"Treatment start and end dates incomplete, reasons for nontreatment or noncompletion poorly documented"*
Intersectoral & community collaboration	Weak engagement between sectors or between health system and community actors; limited coordination, communication, or joint planning	*"Lack of intersectoral and community collaboration"* *"Lack of an integrated approach to address patients' needs beyond the health sector"*

** Representative examples are direct quotations from World Bank studies conducted in Bangladesh, Samoa, Saint Lucia, Tajikistan, and Ukraine referenced above*


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